Connecting Mindfulness and Character Strengths:

Correlational and Experimental Evidence for a Mutual Support Model

Thesis (cumulative thesis)
presented to the Faculty of Arts and Social Sciences
of the University of Zurich
for the degree of Doctor of Philosophy

by Dandan Pang
from China

Accepted in the fall semester 2018
on the recommendation of the doctoral committee:
Prof. Dr. Willibald Ruch (main adviser)
Prof. Dr. Dr. Andreas Maercker

Zurich, 2018

Dedicated to

My grandfather

Thanks for your endless amounts of love

and for shaping me to who I am.

外公，谢谢您！

ABSTRACT

The present dissertation advances toward a more integrated view in psychological research by guiding the attention of mindfulness research to the framework of positive psychology, emphasizing its potential for increasing positive qualities. In order to achieve this goal, the current thesis (1) systematically illustrates the problem of a widely used self-report questionnaire of mindfulness with a large heterogenous sample (N = 2,247) to understand the construct of mindfulness better; (2) attempts to theoretically derive and empirically test (using 1 cross-sectional study and 1 intervention study) a mutual support model of mindfulness and one of the most important constructs in positive psychology – character strengths; and (3) demonstrates the efficacy of the mindfulness-only intervention (MBSR) and the newly developed mindfulness-character strengths-combined intervention (MBSP) in stress reduction and well-being, and further expands its application into the workplace setting. Overall, the present thesis suggests that mindfulness and character strengths mutually enhance one another, creating the dynamics of an upward spiral: increases in mindfulness predict enhancement in specific character strengths, while increases in specific character strengths were assumed to predict growth in mindfulness. This synergetic effect of mindfulness and character strengths were indirectly shown in the improvements of task performance for participants of the combined intervention, as combining mindfulness and character strengths leads to more job-resources as well as better person-organizational fit. Implications are discussed for future research as well as for educations, employees, and organizations.

ACKNOWLEGEMENT

I remember when I was a little girl, my grandfather said: “you are now 10, still in primary school, but soon you will be in secondary school, later on high school, by the age of 18 you will be starting your Bachelor’s study, and at the age of 22 your Master’s study, and before the age of 30 you shall accomplish a PhD”. He saw a PhD in me since I was 10 years old! Having grown up as what is referred to as a “left-behind” child, which is typically a child who is raised by the grandparents while the parents are miles away and only see their children once or twice a year, I am extremely grateful to have had my grandfather in my childhood. He was very knowledgeable, and the most generous, loving person in the world.

Furthermore, I would like to thank all those who helped me throughout my PhD journey. First and foremost, I would like to express my gratitude to my supervisor Prof. Dr. Willibald Ruch, for his dedication in research, his professional guidance as well as all the intellectual exchanges. Sincere thanks to Prof. Andreas Maercker for his advice in the study design and for being a member of the doctoral committee. Many thanks go to my students Valentina, Luisa, Ian, Valerie and Lennart, for their amazing work and contributions to the data collection. Sincere thanks go to my team in Zurich, for all their support and insightful feedback. A big thank you goes to the Swiss National Science Foundation, for giving me the opportunities to develop my career in Switzerland.

Finally, I am grateful for my family in China, for being a secure base for me, as always. Deep appreciation goes to Dodo, for being the best flat mate ever and a positive role model of living one’s own life. Special thanks go to Elisa, for being my PhD “buddy” and sharing this journey together with me. Last but not least, to all my friends in Zurich, for making Zurich a home for me.

FUNDING

This dissertation was funded by the Swiss National Science Foundation [grant number 165465].

TABLE OF CONTENTS

List of tables

General Introduction

General Discussion

Part I

Part II

Part III

List of figures

General Introduction

General Discussion

Part I

Part II

Part III

Abbreviations

ANCOVA	Analysis of covariance
CFA	Confirmatory Factor Analysis
CHIME	Comprehensive Inventory of Mindfulness Experiences
CAMS-R	Cognitive and Affective Mindfulness Scale-Revised
FFMQ	Five Facet Mindfulness Questionnaire
FMI	Freiburg Mindfulness Inventory
HFA	Hierarchical Factor Analysis
JD-R	Job demands-resources
KIMS	Kentucky Inventory of Mindfulness Skills
LSD	Fisher's Least Significant Difference
MAAS	Mindfulness Attention Awareness Scale
MBCT	Mindfulness-Based Cognitive Therapy
MBI	Mindfulness-Based Intervention
MBSR	Mindfulness-Based Stress Reduction
MBSP	Mindfulness-Based Strengths Practice
PAM	Partitioning Around Medoids
PHLMS	Philadelphia Mindfulness Scale
PO fit	Person–Organization fit
RCT	Randomized-Controlled Trial
RML	Robust Maximum Likelihood
S/SE ratio	Skewness divided by its Standard Error
SMQ	Southampton Mindfulness Questionnaire
SMS	State Mindfulness Scale
TMS	Toronto Mindfulness Scale
VIA	Values in Action
WL	Waitlist Control

GENERAL INTRODUCTION

Mindfulness: The art of living in the present moment

> "Do not lose yourself in the past.
>
> Do not lose yourself in the future.
>
> Do not get caught in your anger, worries, or fears.
>
> Come back to the present moment, and touch life deeply.
>
> This is mindfulness."
>
> ----- Thich Nhat Hanh, "*The heart of Buddha's teaching*"

The Buddhist roots of mindfulness: Beyond the cessation of suffering

According to Buddhist legend, some 2,500 years ago, Gautama Buddha, also known as *Siddhārtha*, started his journey to search for an understanding of human suffering and the meaning of life. After six long years of searching and practicing meditation, he came to realize that both extremes of opulence and asceticism led him nowhere. One night, he sat under the Bodhi tree, meditating for many hours, and as the morning star arose, he had a profound breakthrough. Finally, he felt enlightened (Rosenzweig, 2013). During the coming 45 years of his life, Buddha taught the Four Noble Truths, which are arguably the most important of *all* Buddhist teachings and are the path towards enlightenment (Van Gordon, Shonin, Griffiths, & Singh, 2015). The Buddhist literature is very rich and broad. Therefore, a – singular – authentic Buddhist tradition does not exist. Instead there are many Buddhist traditions, some still practiced today, some having gone extinct over the years. Each has their own foundational texts, styles of practice, belief systems, and ontologies (Desbordes, 2016). However, the Four Noble Truths refers to and expresses the *basic orientation of Buddhism* (Gethin, 1998). Figure 1 presents a visualized summary of the Four Noble Truths: (1) suffering; (2) cause of suffering; (3) cessation of suffering; and (4) path that leads to the cessation of suffering (Van Gordan et al., 2015).

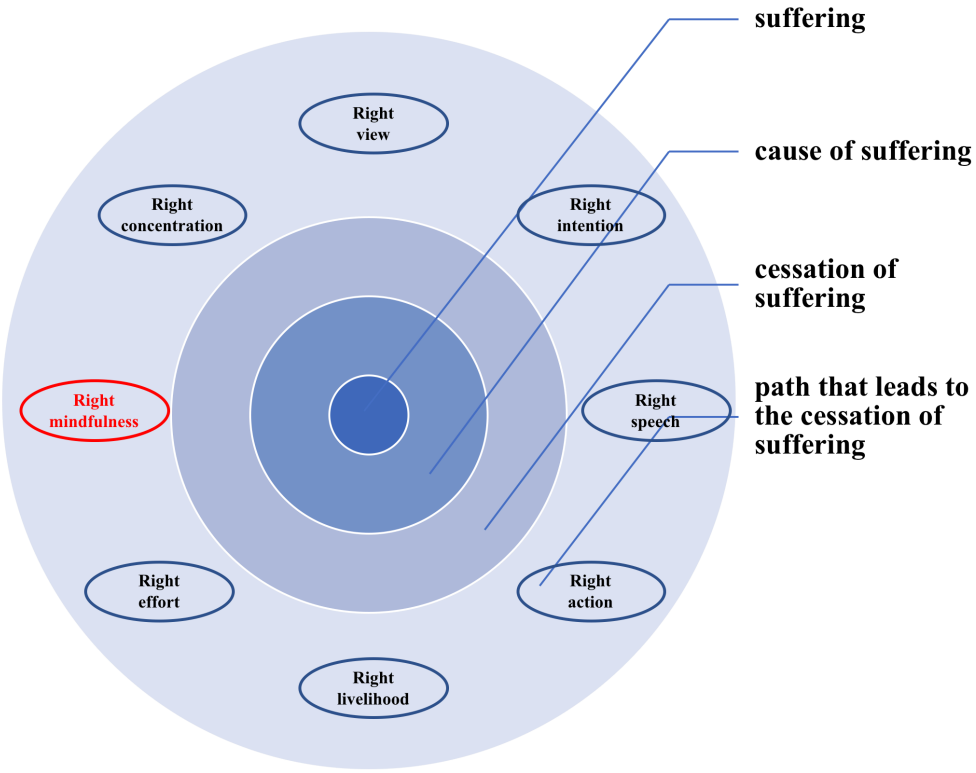


Figure 1. The Four Noble Truths and the Noble Eightfold Path adapted from Hanh (1999).

As shown in Figure 1, the practice of mindfulness belongs to the Noble Eightfold Path, leading to the cessation of suffering. Mindfulness here could be seen as a technique, a skill, a process, a property of the mind, a psychological construct; inherently ethical or neutral; Buddhist, spiritual, secular; a form of (meditation) practice, a way of life; a social movement, a revolution, a paradigm shift; a trend, a lifestyle, a commodity; and empty of inherent existence (Desbordes, 2016). Although the interpretations of mindfulness vary across different schools of Buddhism such as "vipassanā mindfulness" in the Theravāda tradition and "Zen mindfulness" in Japanese Buddhism, they all imply that mindfulness "entails being fully aware of what is unfolding in the here and now" (Shonin, Gordon, & Singh, 2015, p. 7).

If one is not careful, one might have the tendency to mistake Buddha's words for a doctrine or an ideology. Based on the Four Noble Truths, students of Buddhism have been declaring for more than two thousand years that all objects of perception are equal to suffering. Therefore, to come to the realization of the Four Noble Truths one would only have to repeat the mantra "...this is suffering; life is suffering; everything is suffering..." over and

over again. However, this does not correspond exactly to the teaching of Buddha. Buddha said in his sutras that he only wants us to recognize suffering when it is present, to recognize joy when suffering is absent and advised us to preserve our individual and collective well-being (Hanh, 1999). Therefore, the Four Noble Truths can also be looked at from the perspective of well-being. For example, the third Noble Truth – the cessation of suffering – postulates the possibility of well-being and the forth Noble Truth – the path that leads to the cessation of suffering – can also be interpreted as the path that leads to well-being. Accordingly, practicing mindfulness can thus also be seen as one way of learning to appreciate the well-being already present (Hanh, 1999).

In a nutshell, going back to the Buddhist roots, it is clear that the primary goal of the traditional Buddhist contemplative practice – mindfulness practice – reaches far beyond alleviating suffering, by telling us how to reach happiness in the end, emphasizing the potential for increasing positive qualities and spiritual development (Shapiro & Carlson, 2017). The Buddhism approach to pursue happiness differs slightly from psychology's direct and traditional approach (e.g., enabling positive emotions), in which it works indirectly by eliminating the causes of suffering which obstruct happiness (Walsh, 2015). When one directs his attention toward suffering, one begins to see the potential for happiness; the nature of suffering and the way out. The practice of mindfulness is to face one's suffering and transform it in order to bring out well-being. The assumption is, if one lives according to the Noble Eightfold Path, one can cultivate well-being and one's life will be filled with empathy, compassion, joy, ease, insight, and wonder (Brahm, 2006; Hanh, 1999; Shapiro & Carlson, 2017).

From Buddhist roots to positive psychology

This Buddhist root of mindfulness practice fits nicely with the primary goal of the emerging field of positive psychology, which is the scientific study of what makes a "*good life*" and how it can be achieved (Peterson & Park, 2003). The term "positive psychology"

was first used in 1954 by Abraham Maslow (1908 –1970), who noted that the "science of psychology has been far more successful on the negative than the positive side" (Maslow, 1954, p. 354). More than 40 years later, Martin Seligman, president of American Psychological Science Association at the time, reintroduced the term and directed the attention of psychologists towards studying the "*good*" in people and in the world. Mindfulness practice shares similarities with one of the most important constructs in positive psychology, namely the two basic approaches to well-being: (1) the hedonic approach, which focuses on happiness and defines well-being in terms of pleasure attainment and pain avoidance; and (2) the eudemonic approach, which focuses on meaning and self-realization and defines well-being in terms of the degree to which a person is fully functioning (Ryan & Deci, 2001). In addition to seeking positive experience (e.g., joy) and avoiding pain as in Hedonism, mindfulness practice, instead of avoiding the pain, recognizes painful and unpleasant experiences as a natural part of human life (Neff & Davidson, 2016). Similar to Eudemonia that aims at finding purpose and meaning in one's life, mindfulness practice addresses that one should embracing the suffering with feelings of kindness and connectedness, thereby transforming the suffering (Teasdale & Chaskalson, 2011a, 2011b) and enhancing spiritual values, compassion, and meaning (Neff & Davidson, 2016).

The recognition and development of mindfulness in Western psychology

History and definitions. Mindfulness was first translated into English from the Pali word "*sati*" by Thomas William Rhys Davids (1843-1922) as the "active, watchful mind" (Rhys Davids, 1881, p. 107). "*Sati*" contains two primary canonical meanings: (1) memory; and (2) lucid awareness of the present happening (Bodhi, 2011). The literal renderings have been integrated by researchers to suggest that mindfulness means to "remember to pay attention to what is occurring in one's immediate experience" (Shapiro & Carlson, 2017, p. 10). The Buddhist concept of mindfulness has been gradually brought into Western psychological science about four decades ago and the interest has burgeoned since then.

According to a brief literature review of peer-reviewed journal articles using the PsycINFO database (September 26, 2018), 6,974 articles on mindfulness have been published between 1980 and 2017 (see Figure 2). Compared to year 2000 (19 articles), publications on mindfulness have increased more than fifty-fold in 2017 (1,114 articles), while publications on a similar psychological construct such as attention have only increased around three-fold (from 4,882 to 13,601articles). However, despite the enthusiasm for mindfulness as a topic in Western psychology, there is a lack of agreement on the definition, operationalization and measurement of mindfulness (Grossman & Van Dam, 2011).

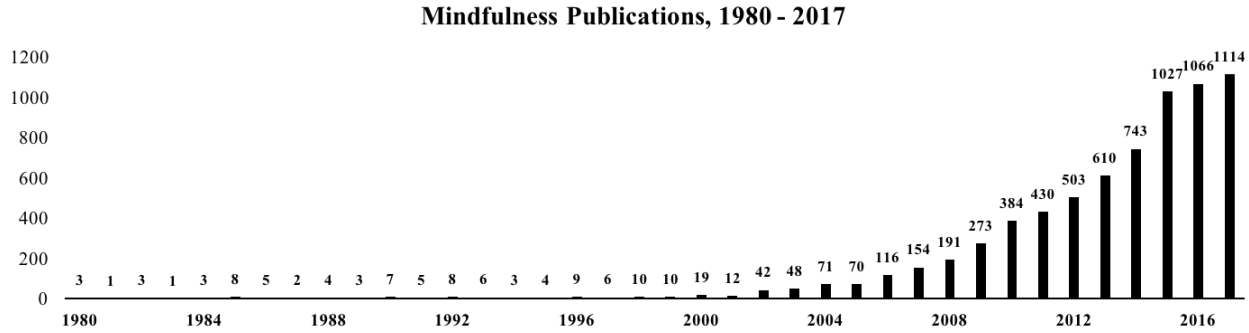


Figure 2. Number of Published Peer-Reviewed Journal Articles on "Mindfulness" Using the PsycINFO Database (September 26, 2018).

The definitions of mindfulness in Western psychology vary greatly from a simple state-like quality (Bishop et al., 2004), or a trait that focuses more on individual differences (Brown & Ryan, 2003) to sets of skills that can be taught independent of their spiritual origins (Kabat-Zinn, 1982; Baer, Smith, & Allen, 2004). Mindfulness was at first mostly regarded as unidimensional, which focused on the attentional aspect. Marlatt and Kristeller (1999, p. 68) defined mindfulness as "bringing one's complete attention to the present experiences on a moment-to-moment basis". Similarly, Brown and Ryan (2003, p. 822) considered mindfulness as "the state of being attentive to and aware of what is taking place in the present". Later, the construct of mindfulness was complemented by another important aspect, that is: acceptance (Bishop et al., 2004; Cardaciotto, Herbert, Forman, Moitra, & Farrow, 2008). In addition to the awareness to the current experience, Bishop and his colleagues (2004) elaborated on

mindfulness, which also included an orientation of "curiosity, openness, and acceptance". Next, while attention further broke down into awareness, intention, and focus on the present (Chadwick et al., 2008; Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007; Shapiro, Carlson, Astin, & Freedman, 2006; Walach, Buchheld, Buttenmüller, Kleinknecht, & Schmidt, 2006), acceptance branched into two facets: non-judging and non-reacting (Baer et al., 2004; Baer, Smith, Hokins, Krietemeyer, & Toney, 2006). Until now, up to five dimensions of mindfulness were distinguished (Baer et al., 2006; Leary & Tate, 2007).

The measurement of mindfulness. Based on the different definitions and understandings of mindfulness, a number of self-report questionnaires have been developed and validated (e.g., Baer et al., 2004; Baer et al., 2006; Brown & Ryan, 2003; Cardaciotto et al., 2008; Chadwick et al., 2008; Feldman et al., 2007; Lau et al., 2006; Walach et al., 2006). Table 1 displays a summary of the self-report measures of mindfulness, which has been shown with favorable psychometric properties.

Table 1. *Description and Summary of the Measurements of Mindfulness with Favorable Psychometric Properties*

Scale	Source	Context/Theory	Trait/State	Components	Citation [a]
MAAS	Brown & Ryan, 2003	Self-determination theory	Trait	1. Attentiveness and awareness	8,045
FFMQ	Baer et al., 2006	CAMS-R, KIMS, FMI, SMQ, MAAS	Trait (skills)	1. Observing 2. Describing 3. Acting with awareness 4. Non-judging of experience 5. Non-reactivity to inner experience	4,263
KIMS	Baer et al., 2004	Dialectical behavior therapy	Trait (skills)	1. Observing 2. Describing 3. Acting with awareness 4. Accept without judgment	2,089
TMS	Lau et al., 2006	Bishop et al. (2004)	State	1. Curiosity 2. Decentering	1,017
CAMS-R	Feldman et al., 2006	Buddhist theory & Kabat-Zinn	Trait	1. Attention 2. Present focus 3. Awareness 4. Acceptance	889
FMI	Walach et al., 2006	Buddhist theory	Trait	1. Unidimensional mindfulness	886
PHLMS	Cardaciotto et al., 2008	Bishop et al. (2004)	Trait	1. Awareness 2. Acceptance	669
SMQ	Chadwick et al., 2008	Kabat-Zinn & cognitive theory	Trait	1. Unidimensional mindfulness	455
SMS	Tanay & Bernstein, 2013	Buddhist theory & Bishop et al. (2004)	State	1. State of mind 2. State of body	109
CHIME	Bergomi, Tschacher, & Kupper, 2014	Eight validated scales and theoretical consideration	Trait	1. Inner awareness 2. Outer awareness 3. Acting with awareness 4. Openness 5. Acceptance 6. Decentering/Non-reacting 7. Insight 8. Relativity	34

Note. [a] Google Scholar Citation Count, September 25, 2018. MAAS = Mindfulness Attention Awareness Scale; FFMQ = Five Facet Mindfulness Questionnaire; KIMS = Kentucky Inventory of Mindfulness Skills; TMS = Toronto Mindfulness Scale; CAMS-R = Cognitive and Affective Mindfulness Scale-Revised; FMI = Freiburg Mindfulness Inventory; PHLMS = Philadelphia Mindfulness Scale; SMQ = Southampton Mindfulness Questionnaire; SMS = State Mindfulness Scale; CHIME = Comprehensive Inventory of Mindfulness Experiences.

Of the well-established self-report measures of mindfulness (see Table 1), the FFMQ is among the most popular and in terms of dimensional coverage the most comprehensive ones. However, there are problems associated with this measure that have often been reported by previous studies (e.g., inappropriate formulations of the reversed items, Grossman, 2011; discrepancy in understanding of several items for people with different levels of meditation experiences, Bergomi, Tschacher, & Kupper, 2013). Therefore, Part I of the present dissertation systematically illustrates the problem of FFMQ with a large heterogenous sample (N = 2,247), and further tests alternative explanations for it. This is important as the first study of the dissertation because it provides a solid foundation for the other two studies. By investigating the problems associated with the widely used FFMQ, mindfulness as a psychological construct and its measurement can be understood better, laying the grounds for further studies.

Current research of mindfulness

Up until now, the primary interest of the Western approach to mindfulness is to demonstrate the ability of mindfulness to treat or weaken dysfunction or illness. Several hundred empirical studies showed that a broad range of mindfulness-based interventions (MBIs) help clinical practitioners successfully decrease psychological and physiological pathology. Examples include anxiety disorder (e.g., Koszycki, Benger, Shlik, & Bradwejn, 2007), attention-deficit disorders (e.g., Mitchell, Zylowska, & Kollins, 2015), chronic pain (e.g., Wong et al., 2011), depression (e.g., Kenny & Williams, 2007), eating disorders (e.g., Kristeller, Wolever, & Sheets, 2014), fibromyalgia (e.g., Schmidt et al., 2011), substance use disorders (e.g., Bowen & Marlatt, 2009), and improving psychological outcomes for cancer patients (Ledesma & Kumano, 2009).

A few studies have started to demonstrate the capacity of mindfulness to enhance positive outcomes. For example, MBIs and mindfulness meditations were also shown to contribute to ecologically responsible behavior (e.g., Brown & Kasser, 2005), empathy and

self-compassion (e.g., Birnie, Speca, & Carlson, 2010), interpersonal relationships (e.g., Carson, Carson, Gil, & Baucom, 2004), persistence (e.g., Evans, Baer, & Segerstrom, 2009), positive affect (e.g., Lutz, Greischar, Rawlings, Ricard, & Davidson, 2004), self-concept (e.g., Haimerl & Valentine, 2001), subjective well-being (e.g., Keng, Smoski, & Robins, 2011), and capacity for meaning-making and personal growth (e.g., Garland, Carlson, Cook, Lansdell, & Speca, 2007; Garland, Farb, Goldin, & Fredrickson, 2015). The studies suggest that mindfulness not only reduces pathology but also leads to improvement in both hedonic (e.g., positive affect) and eudaimonic (e.g., meaning) well-being.

The role of mindfulness at work. Most people spend a substantial part of their life at work. Thus, it is not surprising that psychologist have long discovered the work place as a natural habitat for their research (Stairs & Galpin, 2010; Wrzesniewski, McCauley, Rozin, & Schwartz, 1997). More recently, researches also started to use mindfulness to promote employee health and well-being at work (e.g., Klatt, Buckworth, & Malarkey, 2009; Wolever et al., 2012). Early findings suggest that mindfulness can help reduce stress (Baccarani, Mascherpa, & Minozzo, 2013), reduce emotional exhaustion and increase job satisfaction (Hülsheger, Alberts, Feinholdt, & Lang, 2013). Furthermore, mindfulness could enhance social relationships at work and make employees more resilient when facing challenges (Glomb, Duffy, Bono, & Yang, 2011). Aikens et al. (2014) also found that mindfulness helps increase resilience and vigor as well as reduce perceived stress levels. Much less is known about whether mindfulness relates to individual performance and the results were inconsistent. For instance, Shao and Skarlicki (2009) found a positive association between mindfulness and performance, the relationship being stronger for women than for men; while Hafenbrack and Vohs (2018) found no performance improvement but an impairment of task motivation. Studying the leaders' rather than the employees' mindfulness, Reb and his colleagues found that the leaders' mindful behavior was associated with the employees' well-being (e.g. job satisfaction and need satisfaction) and performance (Reb, Narayanan, & Chaturvedi, 2014).

However, research on the effects of using mindfulness and mindfulness-based interventions in organizational research and practice is still in its early stages.

Altogether, the development of mindfulness research resembles the pathway of psychological science, starting with a swelling interest in the clinical field with focus on one's shortcomings, illnesses, and sins, while only recently having switched the focus to one's potential, virtues, and aspirations. Compared to the research done on mindfulness removing suffering, research done on mindfulness increasing positive outcomes is still under-represented. This should not be the case, as preserving the health and well-being of our body and our spirit is also part of the original goal of Buddhism's contemplative practice. Therefore, Part II and Part III of the present dissertation aim at expanding the traditional paradigm of mindfulness research and applying the MBIs beyond the classical clinical populations. More specifically, Part II of the present dissertation investigated the relationship between mindfulness and character strengths (one of the three most important pillars of positive psychology) as well as their synergetic effects, while Part III investigated the efficacy of MBIs and expanded its application into the workplace settings with methodological rigor (e.g., using a randomized-controlled trial; RCT).

Character Strengths: A family of positive traits

History and definition of character strengths

The study of character strengths belongs to one of the three central concerns of positive psychology: positive experiences, positive individual traits, and positive institutions (Seligman & Csikszentmihalyi, 2000). As a valuable contribution to the field of positive psychology, Peterson and Seligman (2004) attempted to operationalize human strengths and virtues by developing the Values in Action (VIA) classification of strengths and virtues to describe the "*good character*", a vocabulary for speaking about the good life. They argue that the "*good character*" consists of a set of positive and morally valued traits that are reflected in thoughts, feelings, and behaviors. Classification systems like the ones used in clinical

psychology and related disciplines focus on mental distress and mental disorders (e.g., DSM-5; American Psychiatric Association, 2013), but the VIA classification aims at helping individuals discover, explore, and use what is strongest in them, referred to as the "un-DSM".

The selection of the virtues and strengths was done through different ways including brainstorming in core groups of scholars; reviewing literature on good character from disciplines such as psychiatry, youth development, philosophy, and psychology; collecting inventories of virtues and strengths; consulting statements of Boy Scouts of America and the Girl Guides of Canada; and messages in popular song lyrics (Peterson & Seligman, 2004). Several criteria were used to identify character strengths to reduce the initial list of human strengths, such as fulfilling (contributes to individual fulfillment, satisfaction, and happiness broadly construed) and morally valued (is valued in its own right and not for tangible outcomes it may produce; although strengths can and do produce desirable outcomes). Table 2 gives an overview of the criteria used to identify character strengths (Peterson & Seligman, 2004).

Table 2. *Criteria for Identifying a Character Strength*

(1)	**Fulfilling** – A strength contributes to various fulfillments that constitute the good life, for the self and for others.
(2)	**Morally valued** – Although strengths can and do produce desirable outcomes, each strength is morally valued in its own right, even in the absence of obvious beneficial outcomes.
(3)	**Not diminishing others –** The display of a strength by one person does not diminish other people in the vicinity but rather elevates them.
(4)	**Infelicitous opposite** – Being able to phrase the "opposite" of a putative strength in a felicitous way counts against regarding it as a character strength.
(5)	**Assessable** – A strength needs to be manifest in the range of an individual's behavior (thoughts, feelings, and/or actions) in such a way that it can be assessed.
(6)	**Distinctiveness** – The strength is distinct from other positive traits in the classification and cannot be decomposed into them.

Table 2 continued

Table 2 continues

(7)	**Paragons** – A character strength is embodied in consensual paragons.
(8)	**Prodigies** – The prodigies with respect to the strength exist (though it does not apply to all strengths).
(9)	**Selective absence** – People who show selectively the total absence of a given strength exist.
(10)	**Institutions** – The larger society provides institutions and associated rituals for cultivating strengths and virtues and then for sustaining their practice.

Note. The list was compiled according to Peterson & Seligman (2004).

Based on these criteria, 24 character strengths are categorized into six different virtues, which are identified by moral philosophers and religious thinkers across time and different cultures (Dahlsgaard, Peterson, & Seligman, 2005). Three hierarchical levels of the positive characteristics were distinguished, namely *virtues, character strengths* and *situational themes* from the highest to the lowest level. *Virtues* are the abstract core characteristics, defined by philosophers and religious leaders; *character strengths* are the psychological ingredients – processes or mechanisms – that define or exemplify the virtues; *situational themes* are the specific habits that lead people to manifest given character strengths in given situations (Peterson & Seligman, pp. 13-14). For instance, the virtue of humanity can be achieved through kindness, love, and social intelligence. These strengths are similar in a way that they all *involve "tending" and "befriending" others*, but they are also distinct. Table 3 gives an overview on the virtues and character strengths as well as their definitions.

Table 3. *The Values in Action Classification of the Six Virtues and 24 Character Strengths*

Virtue I – Wisdom and knowledge: Cognitive strengths that entail the acquisition and use of knowledge	
(1)	Creativity: Thinking of novel and productive ways to do things; includes artistic achievement but is not limited to it
(2)	Curiosity: Taking an interest in all of an ongoing experience; finding all subjects and topics fascinating; exploring and discovering

Table 3 continued

Table 3 continues

(3) Open-mindedness: Thinking things through and examining them from all sides; not jumping to conclusions; being able to change one's mind in light of evidence; weighing all evidence fairly
(4) Love of learning: Mastering new skills, topics, and bodies of knowledge, whether on one's own or formally. Obviously related to the strength of curiosity but goes beyond it to describe the tendency to add systematically to what one knows
(5) Perspective: Being able to provide wise counsel to others; having ways of looking at the world that make sense to the self and to other people
Virtue II – Courage: Emotional strengths that involve the exercise of will to accomplish goals in the face of opposition, external or internal
(6) Bravery: Not shrinking from threat, challenge, difficulty, or pain; speaking up for what is right even if there is opposition; acting on convictions even if unpopular; includes physical bravery but is not limited to it
(7) Perseverance: Finishing what one starts; persisting in a course of action in spite of obstacles; "getting it out the door"; taking pleasure in completing tasks
(8) Honesty: Speaking the truth but more broadly presenting oneself in a genuine way; being without pretense; taking responsibility for one's feelings and actions
(9) Zest: Approaching life with excitement and energy; not doing things halfway or halfheartedly; living life as an adventure; feeling alive and activated
Virtue III – Humanity: Interpersonal strengths that involve "tending" and befriending" others
(10) Love: Valuing close relations with others, in particular those in which sharing and caring are reciprocated; being close to people
(11) Kindness: Doing favors and good deeds for others; helping them; taking care of them
(12) Social intelligence: Being aware of the motives and feelings of other people and the self; knowing what to do to fit in to different social situations; knowing what makes other people tick
Virtue IV – Justice: Civic strengths that underlie healthy community life
(13) Teamwork: Working well as member of a group or team; being loyal to the group; doing one's share
(14) Fairness: Treating all people the same according to notions of fairness and justice; not letting personal feelings bias decisions about others; giving everyone a fair chance
(15) Leadership: Encouraging a group of which one is a member to get things done and at the same time good relations within the group; organizing group activities and seeing that they happen
Virtue IV – Temperance: Strengths that protect against excess
(16) Forgiveness: Forgiving those who have done wrong; giving people a second chance; not being vengeful
(17) Modesty: Letting one's accomplishments speak for themselves; not seeking the spotlight; not regarding one's self as more special than one is
(18) Prudence: Being careful about one's choices; not taking undue risks; not saying or doing things that might later be regretted

Table 3 continued

Table 3 continues

Virtue VI – Transcendence: Strengths that forge connections to the larger universe and provide meaning
(19) Self-regulation: Regulating what one feels and does; being disciplined; controlling one's appetites and emotions
(20) Appreciation of beauty and excellence: Noticing and appreciating beauty, excellence, and/or skilled performance in all domains of life, from nature to art to mathematics to science to everyday experience
(21) Gratitude: Being aware of and thankful for the good things that happen; taking time to express thanks
(22) Hope: Expecting the best in the future and working to achieve it; believing that a good future is something that can be brought about
(23) Humor: Liking to laugh and tease; bringing smiles to other people; seeing the light side; making (not necessarily telling) jokes
(24) Spirituality: Having coherent beliefs about the higher purpose and meaning of the universe; knowing where one fits within the larger scheme; having beliefs about the meaning of life that shape conduct and provide comfort

Note. The definitions of the character strengths were adapted from Peterson & Seligman (2004).

Despite being recognized and valued across cultures, character strengths can hardly be shown all together in one individual (Peterson & Seligman, 2004). Instead, Peterson and Seligman (2004) postulate that each person possesses three to seven (out of the 24) character strengths, which characterize the person best and thus constituting so-called signature strengths (i.e., "[…] that a person owns, celebrates, and frequently exercises" and it is hypothesized that their "exercise […] is fulfilling", Peterson & Seligman, 2004, p. 18). They also provided a list of ten not yet validated theoretical criteria for a signature strength. For example, people usually have the wish to use a signature strength, behave in accordance to it and are intrinsically motivated to use it (Peterson & Seligman, 2004). People experience a feeling of excitement while displaying their signature strength and that the use of the signature strength is invigorating rather than exhausting (Peterson & Seligman, 2004).

The measurement of the 24 character strengths

Several instruments assessing the 24 character strengths were developed over the past two decades, focusing on the positive end of the strength continuum. For example, the 240-item VIA Inventory of Strengths (VIA-IS; Peterson & Park, 2004); the 182-item VIA

Inventory of Strengths for Youth (VIA-Youth; Park & Peterson, 2003); the Brief Strengths Test (Peterson, 2005); the 9-item VIA-Rising-to-the-Occasion Inventory (VIA-RTO; Peterson et al., 2005); the VIA Structured Interview (VIA-SI; Peterson & Seligman, 2004) and the Character Strengths Rating Form (CSRF; Ruch, Martínez-Martí, Proyer, & Harzer, 2014). Like with many other constructs in positive psychology, there are reservations about using self-report measures to assess character strengths. For example, there is the concern that social desirability might give rise to rosy answers (Peterson & Park, 2004). The answer to this concern is simply "human goodness and excellence are as authentic ("real") as distress and disease" (Peterson, 2006, p. 139), and the latter two have been assessed with self-report measures for a long time. Hence, Peterson and Park (2004) showed that the Marlow-Crowne social desirability scores (Crowne & Marlowe, 1960) do not significantly correlate with the scale scores of character strengths, with the exception of prudence (r = .44) and spirituality (r = .30). The convergence between self- and peer-ratings of VIA-strengths gives additional support to the idea that character strengths are not so much influenced by social desirability. The correlation coefficients yielded a median of .40 and ranged between .26 (honesty) and .69 (spirituality; Ruch et al., 2010).

The most widely used and studied instrument for adults is the VIA-IS (Peterson & Park, 2004). It is a face-valid self-report questionnaire (10 items per strength) using a 5-point Likert-scale (from 5 = *very much like me* through 1 = *very much unlike me*) to measure the degree to which respondents (i.e., adults) endorse each of the strengths of character in the VIA classification. All scales have satisfactory reliabilities (median α = .77; Ruch et al., 2010) and substantial test-retest reliability (r_{tt} = .60 –.83 over three and half years, Gander, Hofmann, Proyer, & Ruch, in press). The VIA-IS has been validated against self- and other-nomination of character strengths and correlates with measures of subjective well-being and happiness (Ruch et al., 2010).

Current research on character strengths

Between 2003 and October 2018, a total of 440 research papers (i.e., 42 book chapters, 324 journal articles, and 74 doctoral dissertations) have been published utilizing the framework of VIA classification, which cover a variety of different domains of life, such as reducing psychological and physical pathologies, increasing psychological and physical health, increasing psychological well-being, and improving achievement; the targets of the study ranges from clinical sample, community sample, children and adolescents at school, employees at workplace, to very specific populations (e.g., Army force).

Similar to mindfulness, the first line of studies pointed out that character strengths play a role in reducing both psychological and physical pathologies (e.g., Seligman, 2015). For example, studies showed that strengths of hope, zest, and leadership were related to fewer problems with anxiety and depression, while strengths of persistence, honesty, prudence, and love were substantially related to fewer externalizing problems such as aggression (Park & Peterson, 2008); negative correlations were found between hope and psychological distress and school maladjustment (Gilman, Dooley, & Florell, 2006); the anxiety disorder of gelotophobia (the fear of being laughed at) was found to be highly related to lower scores in hope, zest, and love (Proyer, Wellenzohn, & Ruch, 2014); negative effects of stress and trauma could be buffered with hope, kindness, social intelligence, self-regulation, and perspective (Park & Peterson, 2006; 2009) as well as vulnerabilities that lead to depression and anxiety could be buffered with transcendence strengths (Huta & Hawley, 2010); higher temperance scores were associated with abstinence, lower risk drinking, and fewer consequences among heavy student drinkers (Logan, Kilmer, & Marlatt, 2010) as well as less addiction to smart phones (Choi et al., 2015); and social intelligence and kindness were associated with less mental health (Vertilo & Gibson, 2014). Moreover, character strengths can play an important role for people with Asperger's Disorder/Autism (Kirchner, Ruch, & Dziobek, 2016), and people with Down syndrome (Dykens, 2006); individuals who did not recover from a physical illness or psychological disorder tended to score lower in their

character strengths, compared to those who had fully recovered (Peterson, Park, & Seligman, 2006). In line with these studies, a few studies further illustrated how character strengths are related to psychological and physical health. For example, healthy behaviors were related to all character strengths except modesty and religiousness (Proyer, Gander, Wellenzohn, & Ruch, 2013). Among patients with traumatic brain injury, character strengths and virtues showed unique value in predicting physical health and disability (Hanks, Rapport, Waldron-Perrine, & Millis, 2014).

The second line of the research illustrated the relationship between character strengths and psychological well-being. According to a recent meta-analysis, 30 samples demonstrated that the VIA-IS correlated up to $r = .56$ with measures of satisfaction with life (Bruna, Brabete, & Izquierdo, 2018; correlation between hope and satisfaction with life). Hope, zest, gratitude, curiosity, and love were the character strengths with the strongest relationships to satisfaction with life across different samples such as Swiss, Germans, and Austrians (Buschor, Proyer, & Ruch, 2013; Martinez-Marti & Ruch, 2014; Ruch, Huber, Beermann, & Proyer, 2007; Ruch et al., 2010), Croatians (Brdar & Kashdan, 2010) and Japanese young adults (Shimai, Otake, Park, Peterson, & Seligman, 2006). In a similar vein, love, honesty, and zest were associate with personal well-being for lay-people in Argentina (Castro Solano & Cosentino, 2016), while in the United Arab Emirates the character strengths of transcendence were associated with greater levels of happiness and better mental health among young adults (Petkari & Ortiz-Tallo, 2016).

The third line of the research presented the relationship between character strengths and achievement. After controlling for IQ, the strengths of perseverance, fairness, gratitude, honesty, hope, and perspective predicted GPA (Park & Peterson, 2008). Similar results were found in a set of later studies: academic achievement among school children is predicted by perseverance and temperance strengths (Peterson & Park, 2009); the character strengths – perseverance, love, gratitude, and hope – predict academic achievement in middle school

students and college students (Park & Peterson, 2009); strengths of perseverance, self-regulation, prudence, judgment and love of learning predicted GPA in college students (Lounsbury, Fisher, Levy, & Welsh, 2009); using a sample of primary school students and a sample of secondary school students, Wagner and Ruch (2015) found that several character strengths were associated with school achievement (e.g., love of learning, perseverance, zest, perspective, gratitude, hope). In addition, military performance among West Point cadets was predicted by the character strength of love (Peterson & Park, 2009).

In addition to the numerous cross-sectional results, the fourth line of the research focuses on strengths-based interventions, which provided first evidence for the causal relationship between character strengths and its function in curtailing negative effects and enhancing positive outcomes. For instance, after attending online interventions that address the usage of signature strengths in a new and different way every day for one week, participants showed enhancement of happiness, reduction of depressive symptoms, and sustainability across six months (Rust, Diessner, & Reade, 2009; Seligman et al., 2005); similar results of strengths-based interventions on well-being and depression were replicated in a recent study (Gander, Proyer, Ruch, & Wyss, 2013). Intervention study focusing on the character strength of humor were found to boost happiness for 3 to 6 months and lower depression in the short-run (Wellenzohn, Proyer, & Ruch, 2016). Participants after a gratitude intervention showed fewer physical symptoms, more time spent exercising, more sleep, and better sleep quality than the control group (Emmons & McCullough, 2003). Beneficial effects were found with character strengths interventions that make up positive psychotherapy for people suffering from depression, anxiety, schizophrenia, nicotine dependence, and borderline personality (Rashid, 2014; Rashid & Anjum, 2007; Seligman, Rashid, & Parks, 2006). Compared to the control group, people with traumatic brain injury, who were in the signature strengths exercise and gratitude exercise condition, showed improvement with their happiness (Andrewes, Walker, & O'Neill, 2014). Identifying and using strengths helped students with

learning disabilities and/or ADHD (Farmer, Allsopp, & Ferron, 2015). Both patients suffering from acute coronary syndrome and cardiac patients benefitted from strengths-based programs/interventions, after which patients experienced increases in health-related quality of life in comparison to controls (Huffman et al., 2011; 2016). Girls in poverty in India who received a strengths-based curriculum exhibited significantly greater physical health and psychosocial health benefits in comparison to those girls who received a similar curriculum without strengths as well as a control group (Leventhal et al., 2015; 2016). A recent paper (Ghielen, Woerkom, & Meyers, 2018) identified 18 (quasi-)experimental studies and illustrated in their systematic review that all types of strengths interventions had positive outcomes in terms of well-being, job outcomes (e.g. work engagement), personal growth initiative, and group or team outcomes (e.g. class cohesion). Yet, studies of strengths-based interventions are still scarce.

The role of character strengths at work. Not much is known about the role of character strengths in the work environment, despite the rapid increase of interest in the last several years. Two categories of research can be found in the literature.

The first one focuses directly on the correlation of character strengths with work-related outcomes, aiming at revealing which character strengths go along with which correlates (e.g., being a manager or leader; work satisfaction etc.). Managers compare to non-managers scored higher in all strengths of wisdom and knowledge except love of learning, all strengths of courage except for honesty, as well as leadership, social intelligence, and self-regulation (Hernandez, 2009). Several character strengths were found to be associated with work satisfaction across a range of occupation types (e.g., hope, and zest; Gander, Proyer, Ruch, & Wyss, 2012; Park et al., 2004; Peterson, Stephens, Park, Lee, & Seligman, 2010; Ruch, 2008), as well as job performance (Harzer & Ruch, 2014), increasing productivity and decreasing turnover rates (Hodges & Asplund, 2010). Individuals who scored higher in zest would be more likely to experience their work as a "calling" (meaning, to work for the sake of

fulfillment instead of financial gain or career advancement), and would report increased work satisfaction, greater reluctance to retire, and fewer sick days (Peterson et al., 2010; Wrzesniewski et al., 1997). The possession of the specific character strengths of teamwork and creativity are important for employees to perform "happily" and "well" (Harzer, Mubashar, & Dubreuil, 2017).

The second category focus on the positive outcomes of *strengths use* (i.e., strengths deployment or strengths application) at work. Strengths use is shown to positively relate to employee work engagement (Botha & Mostert, 2014; van Woerkom, Oerlemans, & Bakker, 2016), well-being (e.g., Harzer and Ruch, 2012; 2013; Harzer et al., 2017), meaning in life and work (e.g., Littman-Ovadia & Steger, 2010), self-ratings and peer-ratings of job performance (e.g., Dubreuil, Forest, & Courcy, 2014; Harzer et al., 2017; Stander, Mostert, & Beer, 2014; van Woerkom & Meyers, 2015), and reduced level of absenteeism (van Woerkom, Bakker, & Nishii, 2016). Interventions with a quasi-experiment, pretest-posttest design showed that "to use signature strength in a new way" led to an increase in the perception of one's job as a calling as well as an increase in life satisfaction (Harzer & Ruch, 2015). A recent study also showed that the use of signature strengths at work was positively linked with well-being and mental health but not with physical health among medical students and resident physicians (Hausler et al., 2017). Strengths use interventions also showed short-term increase in employee's positive affect and short- and long-term increase in their psychological capital (Meyers & van Woerkom, 2017). Therefore, the use of strengths to improve the skills of leaders, teams, and entire organizations is emerging as a popular and successful avenue as well (Mayerson, 2015). The positive outcomes of strengths use were well aligned with the person-job fit literature (Harzer & Ruch, 2013; Harzer et al., 2017; van Woerkom et al., 2016), emphasizing the relevance of congruence between an employee's skills and the demands of a job (Cable & DeRue, 2002).

Connecting mindfulness and character strengths

Given the origin, definition, development in psychological science, as well as their similar functionalities, it is necessary to think about whether these two important constructs – mindfulness and character strengths (as in the framework of VIA) – relate to each other. A few initial evidences can be summarized as following.

First, both mindfulness and character strengths serve a similar function. Mindfulness stems from the journey of Buddha searching for life of meaning (Rosenzweig, 2013), which is in common with how character strengths are developed to contribute to a fulfilling life (Peterson & Seligman, 2004). While the exercise of character strengths is fulfilling (Park & Peterson, 2006), practicing mindfulness also supports its practitioners in living more meaningful and fulfilling lives (Shapiro, Sousa, & Jazaieri, 2016). This overlap is confirmed by numerous studies showing that both mindfulness and character strengths enhance well-being, including hedonic well-being (e.g., positive affect, Brown & Cordon, 2009; Martínez-Martí & Ruch, 2017) and eudemonic well-being (e.g., Brown, Ryan, & Creswell, 2007; Hausler et al., 2017). In addition, researchers in Western psychological science tried to establish a consensus on mindfulness and developed conjointly a testable operational definition: "mindfulness involves the *self-regulation* of attention with an approach of *curiosity*, *openness* and *acceptance*" (Bishop et al., 2004). In this definition, three character strengths are explicitly mentioned, namely the strength of curiosity, open-mindedness, and self-regulation.

Secondly, the overlap also exists in the nature of how people practice and master mindfulness and character strengths. The idea that mindfulness can be cultivated through meditation exercises (Hanh, 1975; Kabat-Zinn, 1990, 1994; Linehan, 1993), especially Buddhist-based meditations, is an essential part of Eastern philosophies (Feuerstein, 2001). Although the VIA character strengths are considered to be fairly consistent traits, they can be nurtured and developed (Seligman, 2004). Similar to the dispositional mindfulness, one can cultivate character strengths through deliberate trainings. A closer look at mindfulness

practice allows the following to be noticed: (1) many mindfulness meditations have a wisdom component, such as promoting a "wise mind" (Linehan, 1993) and "wisdom meditation" (Kristeller, 2003), which leads to the assumption of positive correlations of mindfulness and character strengths assigned to the virtue of wisdom (creativity, curiosity, love of learning, open-mindedness, perspective); (2) the fact that several mindfulness-based programs (such as MBSR; Kabat-Zinn, 1982) helped patients manage chronic pain, the strengths of bravery, perseverance and self-regulation are expected to be related to mindfulness; (3) mindfulness exercises require individuals to keep the attention alive in the present moment (Hanh, 1975, 1991), this means keeping enthusiasm and energy for the here and now, which leads to assuming a positive association between mindfulness meditations and zest; (4) the observing component of mindfulness emphasizes the importance of observing, noticing, or attending to a variety of stimuli, which is also critical for the strength of appreciation of beauty.

Thirdly, there are preliminary results indicating the interconnection between mindfulness and the individual strengths. For example, Baer and Lykins (2011) summarized that mindfulness (e.g., mindfulness-based interventions) was associated with increased curiosity, openness to experience, vitality, emotional intelligence (related to social intelligence), self-regulation, optimism/hope and states of transcendence (especially spirituality). A brief literature review was conducted and a list of examples that demonstrated the overlap between mindfulness and the individual strengths were summarized in Table 4.

Table 4. *Examples Demonstrating the Overlap between Mindfulness and the Strengths of Character in the Literature*

Strengths	Source	Sample/Study	Results
Creativity	Lebuda, Zabelina, & Karwowski, 2016	Meta-analysis (89 correlations obtained from 20 samples in studies published between 1977 and 2015)	The results demonstrated a statistically significant, but weak correlation (r = .22) between creativity and mindfulness
Curiosity	Ivtzan, Gardner, & Smailova, 2011	120 meditators attending a meditation workshop	Meditators showed a higher than average level of curiosity, which may suggest that people who are attracted to meditation and events that encourage personal growth and meaning in life, in general, are initially more curious than those who are not.
Open-mindedness	Brown & Ryan, 2003	313 undergraduates	Mindfulness showed modest positive correlations with the big five trait – openness to experience (r = .18).
Love of Learning	Lanestrand, 2012	Narrative review of written stories and interviews	Mindfulness is to create an environment that propels learning, especially from life itself, by empowering one to learn from his own interests and will.
Perspective	Shapiro, Carlson, Astin, & Freedman, 2006	Theoretical paper	The authors suggest the meta mechanism of mindfulness is the process termed "re-perceiving", which involves a fundamental shift in perspective. "*Rather than being immersed in the drama of our personal narrative or life story, we are able to stand back and simply witness it*" (p. 337).
Perseverance	Evans, Baer, & Segerstrom, 2009	142 native English-speaking psychology students	The study found that trait mindfulness, particularly its nonjudging and non-reacting facets, predicted increased persistence on a difficult lab task.

Table 4 continued

Table 4 continues

Strengths	Source	Sample/Study	Results
Zest	Zangi & Haugli, 2017	Theoretical paper	Zangi and Haugli (2017) suggest that mindfulness can increase overall vitality, and therefore presented a "Vitality Training Program (VTP)", which is based on the Mindfulness-Based Stress Reduction (MBSR) program and the Acceptance and Commitment Therapy (ACT).
Love	Giolzetti, 2012	328 subjects	Results showed that trait mindfulness was a positive predictor of love, as measured by the Triangular Love Scale.
Self-regulation	Bowlin & Baer, 2012	280 undergraduate students	The results showed that four out of the five facets of mindfulness (i.e., describing, acting with awareness, non-judging, and non-reacting) showed a positive correlation with self-control.
Hope	Munoz et al., 2018	A quasi-experimental design (N = 46; meditation group, n = 23; comparison group, n = 23)	The results indicated that the meditation group exhibited significantly higher hope than the comparison group.
Spirituality	Carmody, Reed, Kristeller, & Merriam, 2008	44 participants in the MBSR program	The results showed that participating in the MBSR program increased not only mindfulness, but also spirituality scores.

Note. The strengths that list here shares conceptual overlap with the VIA classification strengths of character, but they are not identical.

As shown in Table 4, the examples offer an idea that mindfulness might be positively correlated with certain character strengths, such as curiosity, perseverance, and zest. However, caution is warranted because these relationships looked at the individual strength instead of the full breadth of the VIA classification. Moreover, most of the strengths were differently defined and were measured with instruments other than the VIA-IS. Therefore, the studies listed in Table 4 can only be seen as a starting point, which can be useful for formulating hypotheses. In order to capture the full picture of the relationship with the 24 character strengths in the VIA framework, more comprehensive measures and variant samples are required.

The integration of mindfulness and character strengths

Given the interconnection of mindfulness and character strengths as well as the benefits of them individually, the idea of merging the two concepts emerged recently (Niemiec, 2014)[1]. A pioneer practitioner, Ryan Niemiec, developed a program that integrated mindfulness and character strengths in an 8-week training, namely the Mindfulness-Based Strengths Practice (MBSP, Niemiec, 2014). The MBSP program involves meditations, exercises, and discussions, which is derived from the existing research and practice. More specifically, the program is built on Thich Nhat Hanh and John Kabat-Zinn's mindfulness work (Kabat-Zinn, 1990; Nhat Hanh, 1975, 1991) and Peterson and Seligman's character strengths research (Peterson & Seligman, 2004). Table 5 gives an overview of the MBSP training.

[1] Mindfulness and character strengths could be seen as "[…] two trees growing side by side, separate but connected, independent yet interconnected, synergistic and mutually supportive" (Niemiec, 2014; p. 48).

Table 5. *An overview of the MBSP training (Niemiec, 2014)*

Session	Core Topic	Description	Sample Exercises
1	Mindfulness and autopilot	The autopilot mind is pervasive; insights and change opportunities start with mindful attention.	• Raisin Exercise • Body Scan
2	Your signature strengths	Identify what is best in you; this can unlock potential to engage more in work and relationships and reach higher personal potential.	• Strengths-Spotting • Character Strengths Breathing Space
3	Obstacles are opportunities	The practice of mindfulness and of strengths exploration leads immediately to two things – obstacles/barriers to the practice and a wider appreciation for the little things in life.	• Statue Meditation • Leaf Meditation
4	Strengthening mindfulness in everyday life	Mindfulness helps us attend to and nourish the best, innermost qualities in ourselves and others, while reducing negative judgments of self and others; conscious use of strengths can help us deepen and maintain a mindfulness practice.	• Mindful Walking • Strengths Gatha
5	Valuing your relationships	Mindful attending can nourish two types of relationships: relationships with others and our relationship with ourselves. Our relationships with ourselves contributes to self-growth and can have an immediate impact on our connection with others.	• Loving-Kindness Meditation (Targeting Strengths)
6	Mindfulness of the golden mean	Mindfulness helps to focus on problems directly and character strengths help to reframe and offer different perspectives not immediately apparent.	• Character Strengths 360 • Fresh Look Meditation
Optional Retreat	MBSP ½-day retreat	Mindful living and character strengths apply not only to good meditation practice but also to daily conversation, eating, walking, sitting, reflecting, and the nuances therein (e.g., opening the refrigerator door, turning a doorknob, creating a smile). This day is therefore, a *practice* day.	• Mindful Eating
7	Authenticity and goodness	It takes character (e.g., courage) to be a more authentic "you" and it takes character (e.g., hope) to create a strong future that benefits both oneself and others. Set mindfulness and character strengths goals with authenticity and goodness in the forefront of the mind.	• Best Possible Self • Signature Strengths Breathing Space
8	Your engagement with life	Stick with those practices that have been working well and watch for the mind's tendency to revert back to automatic habits that are deficit-based, unproductive, or that prioritize what's wrong in you and others. Engage in an approach that fosters awareness and celebration of what is strongest in you and others.	• Golden Nuggets • Sacred Object Meditation

Note. This overview was adapted according to Niemiec & Lissing (2016, p. 21).

At the time when the idea of this dissertation was developed, no empirical studies exited on this topic. Since then, a few preliminary studies on the effectiveness of the MBSP have been described and tested with positive outcomes, which did not influence the logic of the thinking behind the set of studies in this dissertation. Niemiec (2013) described a first non-randomized study with an experimental group (eight individuals completed MBSP) and a control group (seven individuals without intervention). Substantial differences were found from the pre- to the post-measures of flourishing and engagement within the experimental group, while there were no differences of the two measurements pointing out for the control group (Niemiec, 2014). However, the results should be interpreted with caution because of the small sample size, as well as the fact that the groups were not randomized and participants in the experimental group tended to have previous meditation experience. Recently, the effectiveness of the MBSP on well-being has been further tested with a non-randomized control design (Ivtzan, Niemiec, & Briscoe, 2016). They found that participants in the MBSP group scored higher (medium to large effect sizes) in all four measures of post-MBSP: Satisfaction with life, flourishing, engagement, and use of signature strengths, whereas participants in the waitlist control group did not, the only exception being an increase in satisfaction with life scores. Furthermore, there was also evidence from qualitative feedbacks (Niemiec, 2014). Individuals in pilot groups from six countries (United States, Denmark, Hong Kong/China, France, Portugal and Australia) all had positive perceptions towards the MBSP. Participants reported experiencing an increase in their overall well-being and improvement in stress management (Niemiec, 2014).

In addition, there are also anecdotic reports on the first usage of the MBSP in the work setting. Based on the practical experience of a collaborator in Melbourne (Australia), Niemiec (personal communication, December 18, 2014) suggested that the MBSP helped people in the workplace better manage stressful situations and recognize, appreciate and prioritize the character strengths of their colleagues (rather than ruminate and fault-find), which were

considered as critical factors in improving team cohesion and boosting the strength of teamwork.

Overall, there are encouraging first findings on the effectiveness of MBSP, but further work needs to be done to support its usefulness, establishing the rational to integrate mindfulness and character strengths and testing their synergistic effect.

Aims of the Thesis

The present thesis aims at guiding the attention of mindfulness research from removing the pathology back towards its neglected Buddhist roots and putting it into the framework of positive psychology, emphasizing its potential for increasing positive qualities. In order to achieve this goal, the current thesis (1) systematically illustrates the problem of a widely used self-report questionnaire of mindfulness with a large heterogenous sample (N = 2,247) to better understand the construct of mindfulness; (2) by combining with one of the most important constructs in positive psychology – character strengths – the current thesis attempts to theoretically derive and empirically test (using one cross-sectional study and one intervention study) a mutual support model of mindfulness and character strengths: certain character strengths facilitate people to start mindfulness practice, and mindfulness through practice has an impact on the cultivation of certain character strengths; and (3) demonstrates the efficacy of mindfulness-based interventions in stress reduction and well-being, and further expands its application into the workplace setting. Within this thesis, the research is organized into three parts.

Part I.

According to previous studies, the factor structure of the FFMQ inter-correlations of the five facets and the hierarchical five-factor model of the FFMQ seem to vary across different samples (meditators vs. non-meditators) and time points (before vs. after mindfulness-based cognitive therapy). Part I of the thesis illustrates the inconsistencies

typically found with a widely used self-report questionnaire of mindfulness (Five Facets Mindfulness Questionnaire; FFMQ) and provides and tests alternative explanations in three samples with different levels of meditation experience (i.e., current meditators, past meditators, and non-meditators).

The first aim is to explore if there is constrained scaling of the FFMQ, if it occurs in the German-speaking samples as well, and if this leads to an alternative explanation of the current issue regarding the observing facet of the questionnaire. The second aim is to rule out possible diversities in the sample and for the first time exploring the unique features of an unstudied group in the mindfulness research—the past meditators, who practiced meditation a while ago, but stopped for different reasons. The third aim is to replicate the factor structure of the FFMQ in three German-speaking samples, which contain participants with different levels of meditation experience (the current meditators, the past meditators, and the non-meditators). Finally, to highlight these effects (components of mindfulness being differently related to each other in a predictable way in different samples), it was illustrated how the factor structure of the FFMQ changes from level to level across participants with different levels of meditation experience by employing a top-down method. The expectation is to provide an empirically based answer to the question of why the discrepancy regarding the loading of the "observing" facet on an overall mindfulness construct occurs.

Part II.

As mentioned above, no study has examined the relationships between mindfulness and character strengths within the framework of VIA classification. Part II of the thesis attempts to theoretically derive and empirically test (using 1 cross-sectional study and 1 intervention study) a mutual support model of mindfulness and character strengths. The links between mindfulness and character strengths are assumed to be bidirectional: Certain character strengths will be facilitating people to start mindfulness practice, while mindfulness through practice will have an impact on the cultivation of certain character strengths.

The first goal is to establish the overlap between mindfulness and character strengths to explore which character strengths are related to mindfulness. For this, a broad sample (with different levels of meditation experience) was collected, who completed the relevant measures of mindfulness as well as character strengths. It is expected that a list of character strengths that correlates with mindfulness is provided; as well as a list of character strengths that are significantly different between participants with meditation experience and participants without. The second goal is to test whether specific character strengths can be enhanced through mindfulness training, delivering initial evidence for the mutual support model as was proposed. For this, a randomized-controlled design intervention study was conducted, using a mindfulness-based training as an experiment condition. It is expected that after a mindfulness-based training, participants (who have no former meditation experience) would enhance their ratings of mindfulness and specific character strengths compared to participants who simply waited; and the effect would not drop even after six months.

Part III.

Following the mutual support idea of mindfulness and character strengths, part III of the current thesis investigates the synergetic effects of the two concepts. To achieve this goal, a randomized, wait-list controlled design was used to test the effectiveness of two mindfulness interventions on psychological well-being and work-related outcomes, namely (1) the newly developed MBSP (combining mindfulness and character strengths in one intervention), and (2) the well-established MBSR (mindfulness-only intervention). Additionally, whether those intervention effects maintain over a longer period of time or not (i.e., up to six months after the intervention period) was tested. Given that the intervention effects of work-related outcomes could be corroborated, the possible mediators of the intervention effects at the workplace were also explored.

It is expected that: (1) participants in the MBSP condition would report a reduced level of perceived stress, an increased level of well-being, job satisfaction and task performance

regarding the difference between the baseline and the post- when compared to participants of the wait-list control condition; (2) participants in the MBSR condition would report a reduced level of perceived stress, an increased level of well-being, job satisfaction and task performance regarding the difference between the baseline and the post- when compared to participants of the wait-list control condition; (3) the intervention effects maintain over a longer period of time (i.e., up to six months after the intervention period; (4) the effects of MBSP on work-related outcomes would be mediated by the applicability of character.

PART I

Scrutinizing the components of mindfulness: Insights from current, past, and non-meditators

Dandan Pang and Willibald Ruch

Pang, D., & Ruch, W. (2018). Scrutinizing the components of mindfulness: Insights from current, past, and non-meditators. *Mindfulness*. Advance online publication. doi:10.1007/s12671-018-0990-4

Abstract

The factor structure of the Five Facets Mindfulness Questionnaire (FFMQ) seems to vary across samples depending on whether meditators or non-meditators are studied and whether a sample is analyzed before or after mindfulness-based cognitive therapy. The current study illustrates the inconsistencies typically found (e.g., whether all five facets can load on an overall construct of mindfulness), as well as provides and tests alternative explanations in three samples with different levels of meditation experience (i.e., current meditators, past meditators, and non-meditators). Altogether, 2,247 German-speaking volunteers completed the FFMQ and reported their meditation experiences online. Results showed that the scaling of three facets of the FFMQ (i.e., observing, describing, and non-judging) were constrained in all samples. The past meditators revealed unique features in terms of their mindfulness level: (1) stopping practicing meditation reduced their levels of mindfulness in facets of awareness, non-judging, and non-reacting, yet observing and describing seemed to remain and (2) those past meditators with intensive trainings scored higher in all five facets than those past meditators who practiced less. The CFA yielded a good fit in all three samples. A hierarchical factor analysis showed how the factors unfolded from level to level and demonstrated that in particular the observing facet loaded on the overall construct of mindfulness differently across the three samples. The empirical results confirmed the alternative interpretations on why the discrepancy regarding the loading of the "observing" facet on an overall mindfulness construct occurs, but future studies might think of investigating each hypothesis specifically.

Keywords: constrained scaling, FFMQ, hierarchical factor analysis, mindfulness, previous meditation experience

Introduction

Derived originally from ancient Buddhist practice, mindfulness ("[…] to pay attention in a particular way – on purpose, to the present moment, nonjudgmentally," Kabat-Zinn 1994, p. 4) has received considerable attention and developed enormously over the past 30 years. A large amount of studies showed the beneficial effects of mindfulness and mindfulness-based interventions in different domains of life (e.g., Eberth and Sedlmeier 2012; Grossman et al. 2004). The development of the research in mindfulness was facilitated through the recent advancement of valid and reliable measures of mindfulness (for reviews, see Baer 2011; Sauer et al. 2013). One of the most comprehensive instruments in terms of dimensional coverage is the Five Facet Mindfulness Questionnaire (FFMQ; Baer et al. 2006), which was developed on the basis of the combined pool of items from five other mindfulness scales. Exploratory factor analysis of the combined 112 items yielded five clear factors labeled as observing, describing, acting with awareness, non-judging of experience, and non-reactivity to inner experience (Baer et al. 2006). The FFMQ was therefore considered to measure mindfulness through these five facets. The scale demonstrated satisfactory psychometric properties and has been validated across cultures (e.g., Aguado et al. 2015; de Bruin et al. 2012; Michalak et al. 2016).

Typically, the five facets were positively inter-correlated and also loaded on a single overall mindfulness construct (Baer et al. 2008). A second pattern was found with observing being different from the others. More specifically, often a non-significant correlation between observing and non-judging (e.g., Baer et al. 2006, 2008; Lilja et al. 2011; Michalak et al. 2016) was found, and only four of the facets (all but observing) constituted to the overall mindfulness construct. The former pattern was found in participants with meditation experience (meditators) or patients after participating in mindfulness-based cognitive therapy (MBCT; Segal et al. 2013), while the latter was found in participants without meditation experience (non-meditators) or patients before participating in MBCT (Baer et al. 2006; Gu et al. 2016; Williams et al. 2014). By the same token, a few studies used confirmatory factor

analysis (CFA) to compare the correlated five-factor model (which assumes that the scale measures five distinct, but related, facets of mindfulness) with the hierarchical five-factor model (in which the five factors were indicators of an overall mindfulness construct). They found out that the latter performed worse than the former, especially among the non-meditators (e.g., Hou et al. 2014; Veehof et al. 2011). In a nutshell, we encountered convincing evidence suggesting that the inter-correlations of the five facets and the hierarchical five-factor model of the FFMQ cannot be replicated consistently across different samples (meditators vs. non-meditators) and time points (before vs. after mindfulness-based cognitive therapy).

What could account for the discrepancy regarding the observing facet between people with and without meditation experience? Baer (2016) suggested that attention to the present moment can be either reactive and judgmental (i.e., not mindful for the non-meditators) or open, curious, and accepting (i.e., mindful for the meditators). People with limited meditation experience tend to observe in a judgmental way, while experienced meditators tend to observe mindfully (Baer et al. 2006, 2008). Reviewing previous research on the findings of the FFMQ, two additional interpretations were put forward. The observed effects might be related to (1) the constrained scaling of the FFMQ and (2) the heterogeneous sampling.

First, enhanced scores (because of being a meditator or completing a MBCT training) might yield a ceiling effect when there is a constrained scaling. This hypothesis was preliminary supported by a few observations in the literature. At first, we found that across different samples using different language versions of the FFMQ, the mean scores of certain facets were always higher than the middle value, even among people with very limited or no meditation experience (e.g., Aguado et al. 2015; Taylor and Millear 2016). Second, combining the studies that used the English version of the FFMQ (see Table 1), we also noticed that across the 11 samples from five different studies, a high mean score for a given facet has usually been linked to a low standard deviation.

Table 1. *Descriptive Data of the Five Facets of Mindfulness across English-speaking Samples*

Study	Sample	Observing		Describing		Awareness		Non-judging		Non-reacting	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Baer et al. 2008	Community sample (*n* = 293)	3.04	5.48	3.08	7.06	3.07	6.57	2.98	7.33	2.79	4.88
Baer et al. 2008	Students (*n* = 259)	3.04	4.84	3.31	6.01	3.16	5.77	3.47	5.90	2.93	3.82
Baer et al. 2008	Highly educated (*n* = 252)	3.38	5.63	3.75	5.63	3.54	5.21	3.64	5.79	3.26	4.19
Baer et al. 2008	Meditators (*n* = 213)	4.00	4.16	3.98	5.30	3.51	5.10	4.06	5.63	3.67	4.01
Bowman, 2014	Students (*n* = 735)	3.32	5.73	3.37	5.91	3.24	6.00	3.15	6.91	3.00	4.31
Curtiss & Klemanski, 2014	Heterogeneous clinical sample (*n* = 153)	3.16	5.78	3.28	6.51	2.96	6.45	2.84	7.58	2.54	4.43
Gu et al. 2016	Pre-MBCT participants (*n* = 238)	3.13	5.78	3.28	6.36	3.02	5.29	3.09	6.12	2.87	4.94
Gu et al. 2016	Post-MBCT participants (*n = 238*)	3.54	5.02	3.47	6.11	3.23	4.93	3.46	5.85	3.24	4.28
Williams et al. 2014	Community sample (*n* = 940)	3.31	5.29	3.30	6.60	2.96	5.95	2.95	7.38	2.91	4.73
Williams et al. 2014	Participants with depressive disorder (*n* =424)	3.01	5.65	3.25	6.79	3.01	5.44	3.12	6.62	2.81	4.80
Williams et al. 2014	Meditators (*n* = 235)	3.81	4.56	3.81	5.34	3.43	4.89	3.81	6.21	3.57	4.27
Correlation between *M* and *SD* (Pearson's *r*)		-.76		-.92		-.62		-.83		-.53	

Note. *M* = Mean; *SD*= Standard Deviation.

As shown in Table 1, the correlations (Pearson's *r*) between the mean and the standard deviation across the 11 samples were -.53 for the observing facet, -.92 for the describing facet, -.62 for the awareness facet, -.83 for the non-judging facet, and -.53 for the non-reacting fact, respectively. This negative association might accord to the hypothesis that the meditation experience made participants reach a similar level of mindfulness facets and thus made them more homogeneous. However, it might also be that the scales were skewed: certain facets (e.g., describing and non-judging) might have been constrained by the scaling even among people without meditation experience. This is in line with a few studies that reported the multivariate non-normality of the FFMQ scales (e.g., Christopher et al. 2012; Gu et al. 2016).

Second, while one can expect randomly drawn samples to show the same pattern of inter-correlations of the five facets, this will change once a training is involved (as learning curves are different and the training effects would be differently sustained), or when the meditators with different levels of experience are jointly investigated. The reason is that the variation in the scores increases when some yield a stronger training effect than the others (just as when the meditators and the layperson are mixed in one sample), and this subsequently also affects the covariations; i.e., there will be higher inter-correlations. Furthermore, if for some individuals some components of mindfulness are more easily improved than the others or faded out more quickly than the others once training was stopped, then the inter-correlations among the facets will also be affected. Not systematically controlling for these factors might explain the differences found for different studies as mentioned above.

However, no comparison has been made between people who are currently practicing meditation and people who had meditation experience in the past and stopped training at the moment. The criteria to categorize participants as meditators remained somewhat unclear and inconsistent in the literature. A few selected open issues are as follows: how intensive should their meditation experience be until they could be considered as meditators; do meditators

have to practice meditation regularly at the moment; or once they practiced meditation in the past, is it already enough to categorize them as meditators. People stopped their meditation practice for various reasons, such as a change of personal interests or not having enough time. Simply framing them as meditators because of their past meditation experience or simply framing them as non-meditators because they gave up meditation was not appropriate. The meditation experience of these people could range from "tried once and never was interested again" to "constantly practiced for a few years and then stopped".

In sum, we listed three possible explanations (incl. Baer's and ours) for the observed discrepancies that could have an impact on the inter-correlations and factor structure of the FFMQ in different samples and we aim to test all proposed interpretations empirically. First, we aimed at exploring if there is constrained scaling of FFMQ, if it occurs in our German-speaking samples as well, and if this leads to an alternative explanation of the current issue regarding the observing facet. Second, we aimed at ruling out possible diversities in the sample and for the first time exploring the unique features of an unstudied group in the mindfulness research—the past meditators, who practiced meditation a while ago, but stopped for different reasons. Third, we aimed at replicating the factor structure of the FFMQ in three German-speaking samples, which contain participants with different levels of meditation experience (the current meditators, the past meditators, and the non-meditators). Finally, to highlight these effects (components of mindfulness being differently related to each other in a predictable way in different samples), we aimed at illustrating how the factor structure of the FFMQ changes from level to level across participants with different levels of meditation experience by employing a top-down method. We expect to provide an empirically based answer to the question why the discrepancy regarding the loading of the "observing" facet on an overall mindfulness construct occurs.

Methods

Participants

In total, 2,582 participants registered for the study on the website, of which 2,474 participants completed the questionnaire. Seventy-two participants' data were omitted because they gave unusual/inconsistent responses (e.g., those who rated at least 80% of the items with the same value, or those who claimed to have no meditation experience but reported at the same time practicing meditation regularly/unregularly). Participants who did not specify whether they were practicing meditation or what their meditation type was, as well as those who practiced meditations other than Buddhist-based meditations (such as Christian meditation, Yoga, and Tai Chi), were not included for further analysis ($n = 155$). The final sample consisted of 2,247 German-speaking volunteers (571 men, 1,676 women). Three samples were identified according to their meditation experience. The current meditators (sample 1, $n = 745$) comprised a sample of adults who were currently practicing meditation and most of them had intensive meditation experience. The past meditators (sample 2, $n = 791$) consisted of participants who had practiced meditation in the past, but have currently stopped practicing. The non-meditators (sample 3, $n = 711$) comprised people who had no experience with meditation at all.

The meditation experience of the current meditators and the past meditators was measured following a procedure adapted from Baer et al. (2008). First, participants were asked if they had any meditation experience before (yes; yes, but a while ago; no). If they answered "yes" or "yes, but a while ago," they were instructed to provide the following information: (1) duration of regular practice (less than 1 year; 1-5 years; 6-10 years; more than 10 years); (2) frequency of meditation sessions (less than once a week; 1-2 per week; 3-4 per week; 5-6 per week; 7 or more per week); and (3) length of a typical meditation session (less than 10 min; 10-20 min; 21-30 min; 31-45 min; 46-60 min; more than 60 min). If they answered "no," they were instructed not to provide the information. In addition, participants were also asked about the type of meditation they were practicing or have been practicing. A list of options was provided. Participants could mark all that apply from the following:

Mindfulness, Breathing, Zen, Focused-awareness, Vipassana, Tibetan, Samatha, and others. They were required to specify which applied. The characteristics of the meditation experience for the current meditators and the past meditators are shown in Table 2.

Table 2. *Meditation Experiences of the Current and Past meditators*

Characteristics	Total (*n* = 1536)		The current meditators (*n* = 745)		The past meditators (*n* = 791)	
	n	%	*n*	%	*n*	%
Duration of regular practice						
Less than 1 year	748	48.7	233	31.3	515	65.1
1-5 years	484	31.5	281	37.7	203	25.7
6-10 years	126	8.2	91	12.2	35	4.4
More than 10 years	147	9.6	120	16.1	27	3.4
Missing	31	2.0	20	2.7	11	1.4
Frequency of sessions						
Less than once a week	644	41.9	107	14.4	537	67.9
1-2 per week	386	25.1	221	29.7	165	20.9
3-4 per week	227	14.8	176	23.6	51	6.4
5-6 per week	150	9.8	131	17.6	19	2.4
7 or more per week	114	7.4	106	14.2	8	1.0
Missing	15	1.0	4	0.5	11	1.4
Length of typical session						
Less than 10 min	414	27.0	119	16.0	295	37.3
10-20 min	682	44.4	352	47.2	330	41.7
21-30 min	261	17.0	159	21.3	102	12.9
31-45 min	83	5.4	59	7.9	24	3.0
46-60 min	59	3.8	39	5.2	20	2.5
More than 60 min	21	1.4	13	1.7	8	1.0
Missing	16	1.0	4	0.5	12	1.5
Type of Buddhism meditation[a]						
Mindfulness	1000	65.1	550	73.8	450	56.9
Breathing	1107	72.1	518	69.5	589	74.5
Zen	189	12.3	110	14.8	79	10.0
Focused-awareness	166	10.8	97	13.0	69	8.7
Vipassana	144	9.4	107	14.4	37	4.7
Tibetan	78	5.1	53	7.1	25	3.2
Samatha	12	0.8	8	1.1	4	0.5
Others (please specify)[b]	146	9.5	94	12.6	52	6.6

Note. The data of the non-meditators (*n* = 711) were not included in this table since they did not have any meditation experience.

[a]The question form of the "Type of Buddhism meditation" was "check all that apply", for which participants were asked to mark all that apply from a list of options.

[b]Participants who marked others in the "type of Buddhism meditation" also marked at least one of the listed Buddhism meditation types.

As shown in Table 2, compared to the past meditators, the current meditators had extensive meditation experience. Around one third of them had meditated regularly for more than 6 years and around another one third had done so for 1 to 5 years, and the remaining third

had meditated less than a year. Most of them (85.1%) reported practicing meditation quite frequently (more than once a week). A typical practice session for most of them (68.5%) lasted for 10 to 30 min. In contrast, slightly less than two thirds of the past meditators (65.1%) stopped practicing meditation regularly within a year. The majority of them (67.9%) practiced less than once a week, while a typical practice session for them usually lasted less than 20 min (79.0%).

Participants' age ranged from 18 to 80 years ($M = 42.7$, $SD = 11.9$) and more than half of them ($n = 1418$, 63.1%) had a university degree or were studying at the time they filled in the questionnaire. Around half of the participants classified themselves as Christians ($n = 1189$, 52.9%), while only a few participants adhered to other religions ($n = 95$, 4.2%), such as Buddhism ($n = 55$, 2.4%). The rest of the participants either reported that they did not have a religion ($n = 674$, 30.0%) or chose not to provide an answer ($n = 259$, 11.5%). Around a quarter of all participants ($n = 539$, 24.0%) were practicing their religion and slightly more than one third ($n = 851$, 37.9%) were not, while the rest of the participants either did not report religious affiliation or chose not to answer this question ($n = 857$, 38.1%).

Procedure

Participants were requested to complete the FFMQ on a well-established website (www.charakterstaerken.org; hosted by the Section of Personality and Assessment at the Department of Psychology at the University of Zurich) for research purposes between May 2015 and June 2017. The study was promoted by different means through the Internet (e.g., online forum, social media, and the university mailing list). To reach a larger audience of meditation experts, the contact details of German-speaking meditation practitioners were sought on the Internet, after which an invitation letter/email, as well as the instruction of how to participate in the study, was sent to the meditation experts. The volunteers registered on the website with their personal computers and completed the questionnaires online. Respondents were not paid for participating but were provided an automatically generated feedback of their

individual results. The procedure was in line with the guidelines of the Ethics Committee of the Department of Psychology at the University of Zurich.

Measures

The Five Facet Mindfulness Questionnaire-German was adapted (FFMQ; Baer et al. 2006; German translation from Michalak et al. 2016). The FFMQ (Baer et al. 2006) is a self-report questionnaire. It consists of 39 items, which measure mindfulness as a trait with five facets: observing, describing, acting with awareness, non-judging of experience, and non-reactivity to inner experience. Answers are given on a 5-point frequency scale ranging from 1 = "never or very rarely true" to 5 = "very often or always true". The instrument showed adequate psychometric properties across different samples. For instance, Cronbach's α ranged from .75 (non-reacting) to α = .91 (describing) in the original publication (Baer et al. 2006) and .74 (observing) to .90 (non-judging of experience) in the German version (Michalak et al. 2016).

Data Analyses

Descriptive Statistics. Descriptive statistics included internal reliability of instrument (using Cronbach's alpha), mean, standard deviation, and correlations with demographics, as well as distribution characteristics (using skewness, skewness divided by the respective standard errors, and kurtosis).

One-Way Analyses of Covariance. Differences in mindfulness levels (in the form of five facets) across three samples were assessed using analysis of covariance (ANCOVA) with assumption of homogeneity of slopes was met. Demographics (e.g., age and education) were controlled as covariances as they were shown to be related to mindfulness in previous studies (Baer et al. 2008). Subsequently standardized effect sizes were calculated using Cohen's d family of effect sizes (Cohen 1988). According to Cohen's logic, an effect size of .80 or larger

was considered as large, .50 - .79 as medium, and .20 - .49 as small, and an effect size smaller than .20 as negligible.

Cluster Analysis. Cluster analysis was conducted to group the past meditators based on their different profiles of scores on the five FFMQ scales and their meditation experience (duration, frequency, and length) using the clustering algorithm PAM (partitioning around medoids; Reynolds et al. 2006). The "cluster" package in R was used and we chose "Gower distance function" as the distance measure because the data consisted of both continuous variables (i.e., the FFMQ) as well as ordinal variables (i.e., duration, frequency, and length). The silhouette width (Rousseeuw 1987) was used to identify the optimal cluster solution, which is an aggregated measure of how similar an observation is to its own cluster compared to its closest neighboring cluster. The metric can range from −1 to 1, where higher values indicate a better fit.

Factor Analysis. CFA was performed to examine the factor structure of the FFMQ using robust maximum likelihood (RML) estimation with the R package lavaan (Rosseel 2012). RML was used due to the non-normality nature of the scales. Three models were specified, namely (1) a correlative five-factor model, which was identified via EFA and allowed the five factors to inter-correlate, (2) a hierarchical five-factor model, in which the five factors were themselves indicators of an overall mindfulness factor, and (3) a hierarchical four-factor model, which defined describing, awareness, non-judging, and non-reacting as facets of an overall mindfulness construct but excluded observing.

A top-down method namely the hierarchical factor analysis (HFA; Goldberg 2006) was employed to highlight the components of mindfulness being differently related to each other in a predictable way in different samples. Iteratively the number of factors extracted by the algorithm was increased (e.g., one, two, and three) until one reached a point where a component would have been extracted on which no variable has its highest factor loading. Factors were represented as rectangles, whose width corresponds to the factor's size, i.e., to

the amount of variance accounted by that factor. The factor scores of adjacent factor solutions were correlated with each other, and the salient relations ($r > .35$) were represented using arrows. By this means, we could examine how the factors unfold and how they split up or stayed stable from solution to solution. This method elucidates the hierarchical structure of a set of variables top-down, as opposed to the bottom-up tradition that first identifies lower order trait structures and then defines higher order traits based on the patterns of covariance among those. In the present case, we expect that the observing items will not be represented well in the first un-rotated principle component and gain independence (i.e., form a separate factor) at earlier stages in the unfolding in the non-meditators compared to the current meditators and the past meditators.

Data Availability Statement. All data are available at the Open Science Framework (https://osf.io/kcb4d/).

Results

Descriptive Statistics

The descriptive statistics of the FFMQ are displayed in Table 3. The German version of the FFMQ was reliable for all three samples, yielding satisfactory internal consistencies (all scales' Cronbach's $\alpha \geq .76$). The Kolmogorov-Smirnov (K-S) and the Shapiro-Wilk (S-W) tests indicated that all scales of mindfulness were not normally distributed (all with $p < .000$). However, since the sample size was very large, it was more likely to obtain significant p values for the normality tests. Therefore, the distribution of each scale was visualized by histograms with normal distribution curves. We noticed that, for the non-meditators and the past meditators, the observing, describing, and non-judging facets were positively skewed, while for the current meditators, in addition to the three facets, the non-reacting facet was also skewed. Specifically, more than 15% of the respondents of the observing, describing, and non-judging items reached the highest value (i.e., 5): 24.6, 25.9, and 32.0% for the current meditators, 19.7, 20.0, and 23.8% for the past meditators, and 15.7, 17.6, and 22.9% for the

non-meditators. We calculated also the S/SE ratio (skewness divided by its standard error) for each scale (see Table 3). The S/SE ratio smaller than -2.56 could be an indicator that these scales were constrained (Ghasemi and Zahediasl 2012). These results aligned with our assumption that some facets of the FFMQ were constrained and that they were skewed to different extents.

Table 3. *Descriptive statistics, Distribution Characteristics, and the Correlations with Demographics of FFMQ for the Current Meditators, the Past Meditators, and Non-meditators*

	α	*M*	*SD*	*S*	*S/SE*	*K*	r_{sex}	r_{age}	r_{edu}
The current meditators (*n* = 745)									
Observing	.80	3.86	0.55	-0.41	-4.58	-0.03	.04	.11**	.01
Describing	.90	3.90	0.68	-0.48	-5.29	-0.11	-.00	.11**	.16***
Awareness	.88	3.44	0.68	-0.22	-2.42	0.00	-.10*	.17***	.08*
Non-judging	.92	3.81	0.82	-0.55	-6.09	-0.41	-.08*	.19***	.05
Non-reacting	.91	3.31	0.72	-0.27	-2.96	-0.33	-.14***	.17***	.06
The past meditators (*n* = 791)									
Observing	.76	3.68	0.55	-0.40	-4.54	0.39	.11**	.04	.03
Describing	.91	3.72	0.73	-0.37	-4.22	-0.29	.06	.02	.16***
Awareness	.87	3.26	0.68	-0.12	-1.38	-0.18	-.07*	.16***	.07
Non-judging	.91	3.55	0.83	-0.23	-2.60	-0.65	-.08*	.15***	.09*
Non-reacting	.86	3.02	0.66	-0.13	-1.47	-0.18	-.11**	.13**	.03
The non-meditators (*n* = 711)									
Observing	.79	3.48	0.64	-0.50	-5.38	0.12	.06	.08*	.03
Describing	.91	3.59	0.78	-0.34	-3.73	-0.50	.02	.08*	.17***
Awareness	.84	3.28	0.66	-0.13	-1.46	-0.07	-.05	.07*	.01
Non-judging	.90	3.51	0.84	-0.28	-3.07	-0.50	-.02	.20***	.09*
Non-reacting	.84	2.98	0.66	-0.07	-0.74	-0.19	-.15***	.07	.07

Note. α = Cronbach's alpha; *M* = Mean; *SD*= Standard Deviation; *S* = Skewness; *S/SE* = Skewness divided by the respective standard errors; *K* = Kurtosis; r_{sex} = Spearman's correlation with gender (1 = "male", 2 = "female"); r_{age} = Pearson's correlation with age; r_{edu} = Spearman's correlation with education (1 = "less than compulsory education", 2 = "compulsory education", 3 = "apprenticeship", 4 = "baccalaureate", 5 = "university degree").
*p < .05, **p < .01, ***p < .01, two-tailed.

Because of the non-normality nature of scales of the FFMQ, we conducted further adjustments. We carried out log-transformations for our outcome variables and ran the analyses (those require the normal distribution assumption) twice: once for the non-transformed data and once again for the log-transformed data. As we did not notice any differences regarding the outcomes, we reported the results for the non-transformed data. A few significant correlations were found between the five facets of mindfulness and the demographics, such as gender (e.g., females scored higher on the facet non-reacting than the

males), age (e.g., non-judging facet), and education (e.g., describing facet) across all three samples (see Table 3).

The Unique Features of the Past Meditators

We conducted the one-way analyses of covariance (gender, age, and education were controlled as covariates as they correlated with the mindfulness facets, as shown in Table 3) to test the assumption that the mindfulness levels (in the form of five facets) of the past meditators would be between the levels of the non-meditators (i.e., higher) and the current meditators (i.e., lower). The results are presented in Table 4.

Table 4. *Mean Differences of Mindfulness Facets among Three Samples (Controlled for Age, Gender and Education)*

	The current meditators		The past meditators		The non-meditators		Variance		
	M	*SD*	*M*	*SD*	*M*	*SD*	*F* (2, 2241)	*p*	η^2
FFMQ									
Observing	3.86_{a}	0.55	3.68_{a}	0.55	3.48_{a}	0.64	63.57	.000	0.05
Describing	3.90_{a}	0.68	3.72_{a}	0.73	3.59_{a}	0.78	24.15	.000	0.02
Awareness	$3.44_{a,b}$	0.68	3.26_{a}	0.68	3.28_{b}	0.66	11.14	.000	0.01
Non-judging	$3.81_{a,b}$	0.82	3.55_{a}	0.83	3.51_{b}	0.84	17.04	.000	0.02
Non-reacting	$3.31_{a,b}$	0.72	3.02_{a}	0.66	2.98_{b}	0.66	42.16	.000	0.04

Note. The current meditators: $n = 745$; the past meditators: $n = 791$; the non-meditators: $n = 711$. *M* = Mean; *SD* = Standard Deviation. Means in a row sharing subscript are statistically different from each other at $p < .05$ (two-tailed) according to Fisher's least significant difference (LSD) procedure. For all measures, higher means indicate higher scores.

As shown in Table 4, the main effects were significant for all five facets of the FFMQ. Post hoc tests (Fisher's least significant difference; LSD) showed significant differences. For the facets observing and describing, the current meditators scored higher than both the past meditators (Cohen's $d = .33$ and .25) and the non-meditators (Cohen's $d = .64$ and .42), while the past meditators scored higher than the non-meditators in these two facets as well with smaller effect sizes (Cohen's $d = .33$ and .18). The current meditators scored higher than both the past meditators (Cohen's $d = .26$, .31, and .41) and the non-meditators (Cohen's $d = .24$, .36, and .48) in acting with awareness, non-judging, and non-reacting, while no significant differences were found between the other two samples. Results showed that the

current meditators did score higher than the other two samples on all five facets. Although the past meditators gave up practicing meditation, they still scored significantly higher than the non-meditators in observing and describing, but no differences were found between the two groups regarding awareness, non-judging, and non-reacting. After giving up meditation practice, one might conclude that people drop down with respect to awareness, non-judging, and non-reacting. Overall, the past meditators still referred to be able to observe and describe. The different effect sizes suggested that practicing meditation raised the scores of the facets at different speeds and stopping training also decreased the scores of the facets at different speeds.

Beyond simply comparing the mean scores of the three samples, we assume that the past meditation behaviors (the duration of their regular practice, the frequency of their practice, as well as the length of each session) also contributed to the past meditators' current levels of mindfulness, even though they stopped practicing meditation for a while. However, we could not know in advance whether these factors (duration/frequency/length) separately or jointly influence participants' level of mindfulness and to what extent. Thus, a cluster analysis was implemented to explore the systematic patterns of the score profiles of the FFMQ facets among the past meditators. By making no prior assumptions about important differences within a sample, the cluster analysis is a good fit for answering such an explorative question. After calculating silhouette widths for clusters ranging from 2 to 20 for the PAM algorithm, we noticed that 2 or 3 clusters yield the highest value. To further distinguish among different patterns, we decided to take the three-cluster solution. The profiles of the three clusters are summarized in Table 5.

Table 5. *Cluster Analysis of the Past Meditators based on Different Profiles of FFMQ Scales and Meditation Experience*

	Observing		Describing		Awareness		Non-judging		Non-reacting		Duration of the practice		Frequency of the sessions		Length of typical session	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*		*n*		*n*		*n*
Cluster 1	3.57_{a}	0.58	3.64_{a}	0.73	3.19_{a}	0.68	3.51_{a}	0.50	2.92_{a}	0.64	< a year	222	< once a week	228	< 10 min	260
											1-5 years	34	1-4 times a week	30	10-20 min	0
											> 5 years	4	> 4 times a week	2	> 20 min	0
Cluster 2	3.65_{b}	0.53	3.65_{b}	0.70	3.09_{b}	0.62	3.41_{b}	0.47	2.88_{b}	0.65	< a year	249	< once a week	248	< 10 min	0
											1-5 years	30	1-4 times a week	35	10-20 min	261
											> 5 years	10	> 4 times a week	6	> 20 min	28
Cluster 3	$3.87_{a,b}$	0.50	$3.92_{a,b}$	0.70	$3.57_{a,b}$	0.64	$3.81_{a,b}$	0.55	$3.34_{a,b}$	0.60	< a year	37	< once a week	58	< 10 min	33
											1-5 years	138	1-4 times a week	145	10-20 min	165
											> 5 years	47	> 4 times a week	19	> 20 min	24
Variance																
F	19.75		13.60		31.78		15.89		34.43							
p	< .001		< .001		< .001		< .001		< .001							
η^2	0.05		0.03		0.08		0.04		0.08							

Note. Cluster 1: *n* = 260; Cluster 2: *n* = 289; Cluster 3: *n* = 222. *M* = Mean; *SD* = Standard Deviation.
Means in a column sharing subscript are statistically different from each other at p < .05 (two-tailed) according to Fisher's least significant difference (LSD) procedure. For all measures, higher means indicate higher scores.

As shown in Table 5, from cluster 1 to cluster 3 the level of meditation experience increased. Cluster 1 mainly consisted of the past meditators who practiced less than a year, less than once a week, and less than 10 min each session. Cluster 2 consisted of the past meditators who practiced also less than a year, less than once a week, but more than 10 min each session. Cluster 3 consisted of the past meditators who practiced more than once a year, more than once a week, and more than 10 min each session. Five one-way analyses of covariance (one-way ANCOVA; controlled for demographics—gender, age, and education) were conducted to explore the differences of the mindfulness facets among the three clusters. The main effects were significant for all five facets of the FFMQ. Post hoc tests (Fisher's least significant difference; LSD) uncovered the following significant differences: For all facets of the FFMQ, the past meditators in cluster 3 scored higher than both the past meditators in cluster 1 (Cohen's d = .55, .39, .58, .57, and .68, respectively) and the past meditators in cluster 2 (Cohen's d = .43, .39, .76, .78, and .74, respectively), while no significant differences were found between the latter two samples. Results showed that those who practiced more among the past meditators (cluster 3) achieved significantly higher mindfulness levels (in all five facets) than those who practiced less (cluster 1 and cluster 2). The results revealed that the meditation experience that influenced the level of mindfulness among the past meditators indicated the need to carry out separate analyses for the past meditators and the other two samples.

The Factor Structure of the FFMQ

The goodness-of-fit indices of the CFA models among the three samples are displayed in Table 6. All models fit the three samples well. In accordance with the literature, we also noticed a slight drop of the fit indices of the hierarchical five-factor model for the non-meditators compared to the other two models. Unlike what has been found in the literature, observing loaded significantly on the overall construct of mindfulness in our non-meditator sample. However, similar to what has been reported before, the same loading patterns were

also detected in our samples, i.e., the non-meditators had a lower loading (.41) of the observing facet on the overall mindfulness construct compared to the current meditators (.60). The loadings of the past meditators ranged in the middle with .48. When we compared the mean score of our non-meditator sample with the non-meditator samples from the previous studies (see Table 1), we noticed that our non-meditator sample has a slightly higher mean in almost all facets.

Table 6. *Goodness-of-fit Indices for FFMQ among three Samples*

Models	χ^2	*df*	χ^2/df	RMSEA 90% CI *p* value	SRMR	CFI	TLI	NNFI	AIC
Correlative five-factor model									
The current meditators	208.64	80	2.61	.05 90% [.04 - .05] *p* = .766	.03	.99	.98	0.98	17342.34
The past meditators	200.85	80	2.51	.04 90% [.04 - .05] *p* = .912	.03	.99	.98	.98	19866.63
The non-meditators	305.17	80	3.81	.06 90% [.06 - .07] *p* = .002	.04	.97	.96	.96	19290.27
Hierarchical five-factor model									
The current meditators	258.28	85	3.04	.05 90% [.05 - .06] *p* = .291	.04	.98	.98	.98	17381.98
The past meditators	286.26	85	3.37	.05 90% [.05 - .06] *p* = .128	.06	.98	.97	.97	19942.04
The non-meditators	369.00	85	4.34	.07 90% [.06 - .08] *p* = .000	.07	.96	.95	.95	19344.10
Hierarchical four-factor model									
The current meditators	130.95	50	2.62	.05 90% [.04 - .06] *p* = .702	.03	.99	.99	.99	13893.42
The past meditators	132.70	50	2.65	.04 90% [.03 - .06] *p* = .760	.03	.99	.99	.99	15897.35
The non-meditators	212.70	50	4.25	.07 90% [.06 - .08] *p* = .001	.05	.97	.96	.96	15290.94

Note. The current Meditators: *n* = 745; the past Meditators: *n* = 791; the non-Meditators: *n* = 711.

Table 7. *Correlations of Five Facets Scales of FFMQ among Three Samples*

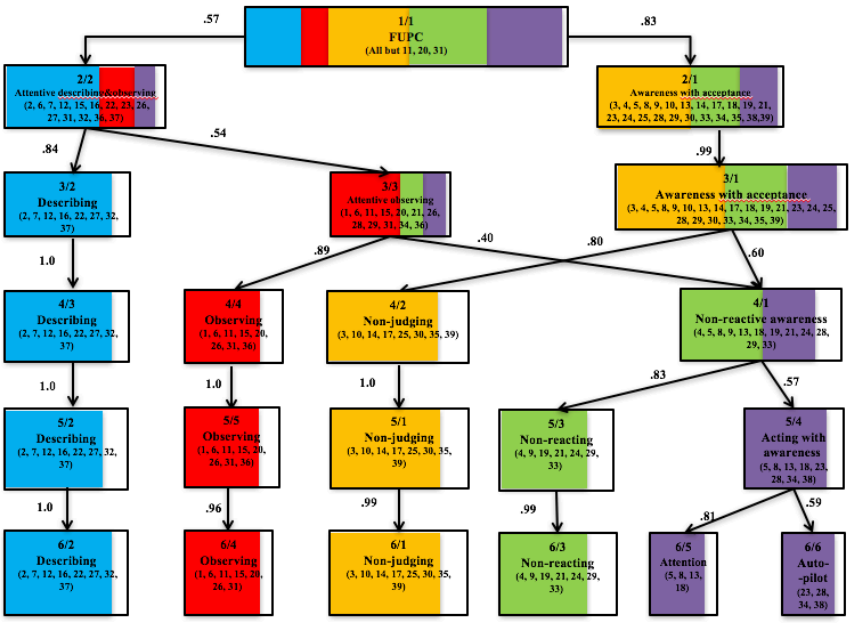
	The current Meditators (n = 745)					The past Meditators (n = 791)					The non-Meditators (n = 711)				
Facets	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
1. Observing	-					-					-				
2. Describing	.38***	-				.37***	-				.35***	-			
3. Awareness	.46***	.45***	-			.37***	.43***	-			.23***	.37***	-		
4. Non-judging	.28***	.38***	.57***	-		.09**	.31***	.50***	-		.09*	.25***	.40***	-	
5. Non-reacting	.45***	.41***	.61***	.60***	-	.33***	.37***	.53***	.51***	-	.25***	.27***	.44***	.46***	-

Note. *p < .05, **p < .01, ***p < .001, two-tailed.

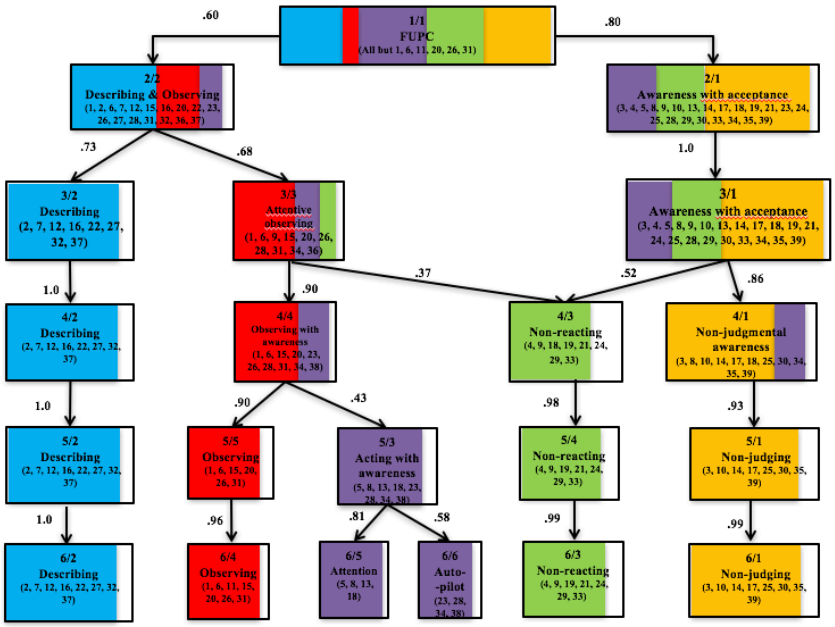
Furthermore, the correlations among the facets were computed. As shown in Table 7, all facets correlated significantly with each other for all three samples, but the facet observing correlated much lower with the facet non-judging for both the past meditators and the non-meditators. These two correlations were significant despite a very low value of r = .09 because we have a rather large sample size. The correlations of the current meditators and non-meditators were comparable to the previous studies (Baer et al. 2008; Michalak et al. 2016).

To further disclose the development of the factor structure, the HFA procedure proposed by Goldberg (2006) was conducted. An overview of the succession of factor extraction with correlations between the factors from adjacent levels of extraction is depicted in Fig. 1a for the current meditators, Fig. 1b for past meditators, and Fig. 1c for the non-meditators. The codes above the factor names refer to the factor numbers at a certain level; for instance 4/1 and 5/3, respectively, refers to the first factor at the four-factor level and third factor at the five-factor level. At the top level of Fig. 1a-c is the first un-rotated principal component (FUPC), which reflects the general factor of "mindfulness."

1a The Current Meditators



1b The Past Meditators



1c The Non-Meditators

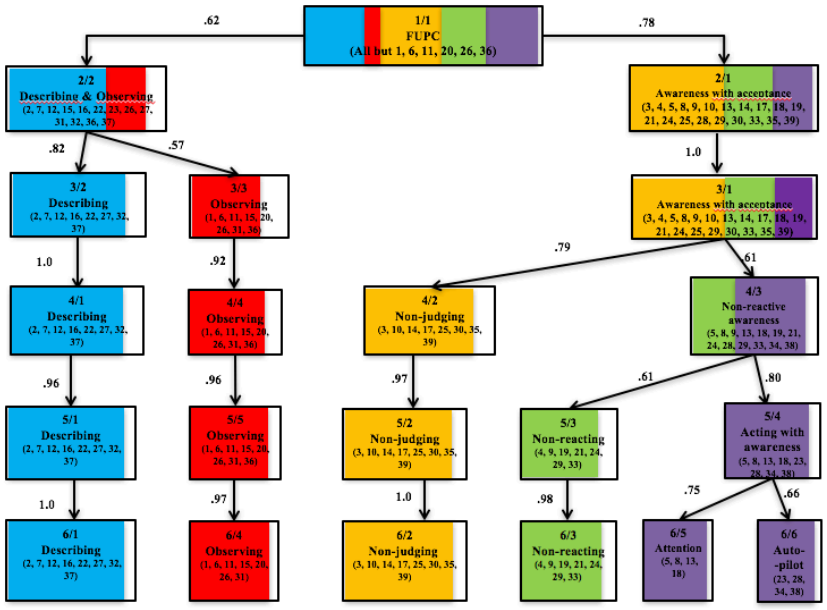


Figure 1. Hierarchical Factor Analysis for the current meditators (1a, *n* = 754), the past meditators (1b, *n* = 794), and the non-meditators (1c, *n* = 716).

Varimax-rotated principal components (FUPC, first unrotated principal). Codes refer to factor numbers at a certain level, e.g., 3/1, the first factor at the three-factor level). Factors are represented as rectangles, whose width corresponds to the factor's size – that is, to the amount of variance accounted for by that factor (the width of the

colored rectangles indicated each facets' explained variance on this factor, only facets had items that their loadings were equal or larger than .40 were indicated). Numbers in the bracket indicated the items of the scale, which had loadings that were equal or larger than .40 on the corresponding factor. The colored code: observing = red; describing = blue; acting with awareness = purple; non-judging = yellow; non-reacting = green.

For the current meditators (cf. Fig. 1a), in the first step, all items of the FFMQ loaded on the FUPC except three items of the observing facet. Then, the FUPC split into "awareness with acceptance (2/1)" and "attentive describing and observing (2/2)". All items of awareness, non-judging, and non-reacting loaded on the first factor of the second level (2/1), whereas all items of describing and 5 items of observing loaded on the second factor of the second level (2/2), and item 23 had a double loading on both factors (2/1 and 2/2) at this level. While the factor "awareness with acceptance (2/1)" remained unchanged until the third iteration (3/1), the factor "attentive describing and observing (2/2)" split into "describing (3/2)" (which remained unchanged with respect to the following factor solutions) and "attentive observing (3/3)". "Observing (4/4)" and "non-judging (4/2)" then became separate factors at the next level and stayed unchanged for the following iterations, whereas a new factor "nonreactive awareness (4/4)" was fused from factors (3/1) and (3/3). At the following level, the "non-reactive awareness" continued to split into "non-reacting" (5/3, remained unchanged) and "acting with awareness" (5/4). The former remained unchanged at the next level while the latter further broke down into two lower hierarchical factors: "attention" and "autopilot".

The non-meditators showed a different pattern in two folds in comparison to the current meditators (see Fig. 1c): First, the majority of the items of the facet observing (6 out of 8) did not load on the FUPC, while for the current meditators, more than half of the observing items (5 items) loaded on this general factor. Second, at the third level, the items of observing began loading on one factor and remained stable for the non-meditators, while for the current meditators, the observing items were embedded with some items of other facets (such as items of awareness and non-reacting) from the beginning and only became a separate factor at later levels. The remaining pattern was very similar to the current meditators.

For the past meditators (see Fig. 1b), the HFA yielded a pattern in between the current meditators and the non-meditators. The majority of the observing (6 out of 8 items) items did not load on the FUPC, which is similar to the pattern provided by the non-meditators. However, at the third level, the third factor (3/3) was still fused from items of observing, awareness, and non-reacting. This fusion continued at the fourth iteration where the factor "non-reacting (4/3)" emerged. Thus, "observing (5/5)" only became a separate factor at the fifth level, together with "awareness (5/3)" and "non-judging (5/1)". Similar as the current meditators and the non-meditators, while the other factors remained unchanged, "acting with awareness (5/3)" broke down into two lower hierarchical factors: "attention" and "autopilot".

To sum up, observing loaded lower than the other facets on the overall construct of mindfulness across all three samples. Moreover, much less observing items loaded on the overall construct of mindfulness for those who had less meditation experience (i.e., the past meditators and the non-meditators). For the non-meditators, the facet observing emerged as a separate factor already at the third level and stayed unchanged since then. However, for the current meditators, observing was a more significant part of the general factor from the very beginning and was fused with items of other facets until it finally crystallized as a unique factor at the forth iteration.

Discussion

The primary goals of the study were to (1) examine the constrained scaling of the FFMQ; (2) explore the unique features of the past meditators; (3) replicate the factor structure of FFMQ using CFA in German-speaking samples; and (4) using HFA to illustrate how the factor structure of FFMQ changes from level to level across participants with different levels of meditation experience.

We indeed found evidence that three scales of the FFMQ were constrained (i.e., observing, describing, and non-judging). An average of 15% of the respondents of these scales reaching the highest value was too high and we would not expect it from a normal

distribution. In an ideal situation of the normal distribution whose mean equals three and which ranges from one to five, the respondents reaching the highest value should be less than 3% (simulated with a sample size of 10,000, and SD of .50 to .75). This meant that some items of the FFMQ were too simple, and those who could have had a higher score were more prone to reach the highest level possible, in particular the meditators or participants after the MBCT. Therefore, as reported in previous studies (Baer et al. 2006; Gu et al. 2016; Williams et al. 2014), in those samples whose scores were skewed in a similar way, the facets correlated higher and all load on the overall construct, whereas for the non-meditators or participants before the MBCT, not as many people reached the highest value possible and thus the correlation and the loadings were also lower. These results could also be linked to our CFA results. Because our non-meditators scored high in the five facets and reached the constrained scaling in observing, describing, and non-judging as what usually happened in the meditators, the CFA model which assumes all five facets loaded on the overall mindfulness also gained a great fit despite a slight lower loading of the observing facet across all three samples. Unlike what has been found in the literature, observing loaded significantly on the overall construct of mindfulness even in our non-meditator sample. This should be link to the fact that our non-meditator sample obtained higher mean scores on almost all facets compared to previous samples. The reason behind it could be that our non-meditators were probably very open-minded and curious because they came and filled in the questionnaires on our website voluntarily without any incentives and were curious to get a feedback on their own scores. On the other hand, our sample was also rather well educated: More than half of the participants had a university degree or were studying at the time they filled in the questionnaire.

Compared to the past meditators and the non-meditators, the current meditators had extensive meditation experience. This was why the current meditators scored significantly higher in all five facets of mindfulness. The fact that the past meditators were similar to the non-meditators in acting with awareness, non-judging, and non-reacting, but scored higher in

observing and describing as well as different effect sizes among the five facets across all three samples suggested that there might be different cultivation and extension procedures for the five facets of mindfulness. For example, once people learned how to link body sensations to emotions, they would be able to observe and describe feelings more precisely and this is unlikely to wash out fast, maybe not at all. On the other hand, the other three facets might need continuous training or regular training at the current moment to develop them, as they were cultivated by actively applying certain techniques (e.g., using breathing as an anchor). The fact that those past meditators with intensive trainings (cluster 3—more than once a year, more than once a week, and more than 10 min each session) scored higher in all five facets than those past meditators who practiced less (cluster 1 and cluster 2) revealed that giving up training would not be too much of a loss as long as one trained intense enough in the past. These results supported the hypothesis that the past meditators should be separated from the current meditators and the non-meditators and be investigated as an independent sample. Although some of them did have extensive meditation experience, stopping practicing meditation made them notably different in terms of their mindfulness level from both the current meditators and the non-meditators. This can also be revealed in our findings of HFA, how the factors unfolded from solution to solution differed across all three samples.

The HFA illustrated a clear picture on how observing facet loaded on the overall construct of mindfulness differently across the three samples. Observing loaded lower on the overall construct of mindfulness across all three samples, and much lower for those who had less meditation experience (i.e., the past meditators and the non-meditators). Regarding people with no meditation experience, the facet observing emerged at the third iteration and stayed unchanged since then. However, with respect to the current meditators, observing was a more significant part of the general factor from the very beginning and crystallized as a unique factor only at the forth iteration. Furthermore, the results also supported the proposed explanation by Baer et al. (2006, 2008): People with different levels of meditation experience

may observe differently with non-meditators tending to observe in a judgmental way and the meditators tending to observe mindfully. This pattern could be discovered within the development of the factor structures from solution to solution. For the non-meditators, instead of being fused with other items into one factor, observing became a separate factor quite early, while for the current meditators and the past meditators, there were levels where observing items were fused with the items from other facets (i.e., awareness and non-reacting). This could provide a statistical support for the statement that meditators and non-meditators observed differently, with the former being more likely to observe mindfully and the latter being more likely to observe without being attentive and non-reactive.

All in all, the study provided empirical answers to the issues of the observing facets of the FFMQ. It could be a combination of different reasons: (1) the non-normality nature of the FFMQ; (2) the heterogeneous sampling, which leads to the different procedures of the cultivation as well extinction of the five facets; (3) differences between laypersons and meditators on how they observe. However, these effects were currently mixed up and future studies might think of investigating each hypothesis specifically.

Limitations and Future Research

The results of the study must be interpreted with caution due to several limitations. First, although by using internet recruitment we could reach large and geographically distributed populations (all over German-speaking countries), it could also cause a selection bias in our data. For instance, we were more likely to recruit participants who were interested in positive psychology in general or who were curious about themselves. We tried to avoid this selection bias by advertising our study as much as we can and by writing invitation letters/e-mails and addressing the importance of the study to the targeted participants. It is different as simply putting the questionnaires on the website and waiting for individuals who happen to have Internet, visit the website, and decide to participate in the survey. However, we must acknowledge that at least some participants were biased, and this could affect the

representativeness of the study, and it could also be the reason why we have a rather mindful non-meditator sample. Given that it is hard to reach the relevant sample (in particular the meditators), this sample method is still effective despite its limitations. Future studies could consider it as the first approach and expand to other means such as paper-pencil questionnaire, telephone, or personal interview to obtain a broader sample.

Second, we discussed the impact of meditation experience on mindfulness cultivation (i.e., whether one is currently practicing meditation and how intense one practices) and we found inconsistency across the five facets (i.e., some were easier to cultivate and some fade away faster). However, the practicing experience alone is not the full picture, as the participants in our study as well as reported in other studies all uniformly underwent similar trainings. Other factors should also play a role, which was not controlled in our current study. For instance, why the past meditators stopped their meditation practice could be of importance, and future studies might explore this question in more details. In addition, we could well imagine participants' education, personal experiences, and their cognitive ability (e.g., memory and learning) could also influence their mastery of mindfulness skills. Taking describing as an example, which encourages practitioners to describe, label, or note the observed phenomena by covertly applying words (Baer et al. 2004), was related to education as shown in previous studies (Baer et al. 2008; Van Dam et al. 2009). Therefore, future studies should consider controlling the possible covariance.

Third, the measure of the meditation experience was not optimal in the current study. The meditation experience of participants was asked by using ordinal scales, which was hard to compare in further analysis. Future studies might consider asking directly the concrete numbers to make linear modeling possible. In addition to the general questions, one should also consider asking participants' daily behavior in specific context (e.g., event sampling methods).

Acknowledgments. The authors thank Richard Bruntsch and Sonja Heintz for their help with setting up the questionnaires on the website, as well as Jennifer Hofmann and Alexander Stahlmann for their comments on an earlier version of the manuscript.

Author Contributions. DP: initiated, designed, and executed the study, analyzed the data, and wrote the paper. WR: initiated and designed the study, assisted with the data analysis, and collaborated in the writing.

Funding. This study was funded by the Swiss National Science Foundation (grant number 165465).

Compliance with Ethical Standards

Conflict of Interest. The authors declare that they have no conflict of interest.

Ethical Approval. All procedures performed in studies involving human participants were in accordance with the ethical standards of the Ethics Committee of Department of Psychology at the University of Zurich and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent. Informed consent was obtained from all individual participants included in the study.

References

Aguado, J., Luciano, J. V., Cebolla, A., Serrano-Blanco, A., Soler, J., & García-Campayo, J. (2015). Bifactor analysis and construct validity of the Five Facet Mindfulness Questionnaire (FFMQ) in non-clinical Spanish samples. *Frontiers in Psychology, 6*, 404. https://doi.org/10.3389/fpsyg.2015.00404.

Baer, R. A. (2011). Measuring mindfulness. *Contemporary Buddhism, 12*, 241-261. https://doi.org/10.1080/14639947.2011.564842.

Baer, R. (2016). Assessment of mindfulness and closely related constructs: introduction to the special issue. *Psychological Assessment, 28*, 787. https://doi.org/10.1037/pas0000309.

Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment, 13*, 27-45. https://doi.org/10.1177/1073191105283504.

Baer, R. A., Smith, G. T., Lykins, E., Button, D., Krietemeyer, J., Sauer, S., et al. (2008). Construct validity of the five facet mindfulness questionnaire in meditating and nonmeditating samples. *Assessment, 15*, 329-342. https://doi.org/10.1177/1073191107313003.

Baer, R., Smith, G., & Allen, K. (2004). Assessment of mindfulness by self-report: the Kentucky inventory of mindfulness skills. *Assessment, 11*, 191-206. https://doi.org/10.1177/1073191104268029.

Bowman, A. S. (2014). *Evaluating the psychometric properties of the five-facet mindfulness questionnaire: An item response theory analysis* (Master's thesis, Middle Tennessee State University). Available from ProQuest Dissertations & Theses Global database. (UMI No. 1556621)

Christopher, M. S., Neuser, N. J., Michael, P. G., & Baitmangalkar, A. (2012). Exploring the psychometric properties of the five facet mindfulness questionnaire. *Mindfulness, 3*, 124-131. https://doi.org/10.1007/s12671-011-0086-x.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale: Erlbaum.

Curtiss, J., & Klemanski, D. H. (2014). Factor analysis of the five facet mindfulness questionnaire in a heterogeneous clinical sample. *Journal of Psychopathology and Behavioral Assessment, 36*, 683-694. https://doi.org/10.1007/s10862-014-9429-y.

de Bruin, E. I., Topper, M., Muskens, J. G., Bögels, S. M., & Kamphuis, J. H. (2012). Psychometric properties of the Five Facets Mindfulness Questionnaire (FFMQ) in a meditating and a non-meditating sample. *Assessment, 19*, 187-197. https://doi.org/10.1177/1073191112446654.

Eberth, J., & Sedlmeier, P. (2012). The effects of mindfulness meditation: a meta-analysis. *Mindfulness, 3*, 174-189. https://doi.org/10.1007/s12671-012-0101-x.

Ghasemi, A., & Zahediasl, S. (2012). Normality tests for statistical analysis: a guide for non-statisticians. *International Journal of Endocrinology and Metabolism, 10*, 486-489. https://doi.org/10.5812/ijem.3505.

Goldberg, L. R. (2006). Doing it all bass-ackwards: the development of hierarchical factor structures from the top down. *Journal of Research in Personality, 40*, 347-358. https://doi.org/10.1016/j.jrp.2006.01.001.

Grossman, P., Niemann, L., Schmidt, S., & Walach, H. (2004). Mindfulness-based stress reduction and health benefits: a meta-analysis. *Journal of Psychosomatic Research, 57*, 35-43. https://doi.org/10.1016/S0022-3999(03)00573-7.

Gu, J., Strauss, C., Crane, C., Barnhofer, T., Karl, A., Cavanagh, K., & Kuyken, W. (2016). Examining the factor structure of the 39-item and 15-item versions of the Five Facet Mindfulness Questionnaire before and after Mindfulness-Based Cognitive Therapy for people with recurrent depression. *Psychological Assessment, 28*, 791-802. https://doi.org/10.1037/pas0000263.

Hou, J., Wong, S. Y. S., Lo, H. H. M., Mak, W. W. S., & Ma, H. S. W. (2014). Validation of a Chinese version of the Five Facet Mindfulness Questionnaire in Hong Kong and development of a short form. *Assessment, 21*, 363-371. https://doi.org/10.1177/1073191113485121.

Kabat-Zinn, J. (1994). *Wherever you go, there you are: mindfulness meditation in everyday life*. New York, NY: Hyperion.

Lilja, J., Frodi-Lundgren, A., Hanse, J., Josefsson, T., Lundh, L.-G., Sköld, C., et al. (2011). Five Facets Mindfulness Questionnaire—reliability and factor structure: a Swedish version. *Cognitive Behaviour Therapy, 40*, 291-303. https://doi.org/10.1080/16506073.2011.580367.

Michalak, J., Zarbock, G., Drews, M., Otto, D., Mertens, D., Ströhle, G., et al. (2016). Erfassung von Achtsamkeit mit der deutschen Version des Five Facet Mindfulness Questionnaires (FFMQ) [Assessment of mindfulness with the German version of the Five Facet Mindfulness Questionnaires (FFMQ)]. *Zeitschrift für Gesundheitspsychologie, 24*, 1-12. https://doi.org/10.1026/0943-8149/a000149.

Reynolds, A. P., Richards, G., de la Iglesia, B., & Rayward-Smith, V. J. (2006). Clustering rules: a comparison of partitioning and hierarchical clustering algorithms. *Journal of Mathematical Modelling and Algorithms, 5*, 475-504. https://doi.org/10.1007/s10852-005-9022-1.

Rosseel, Y. (2012). Lavaan: an R package for structural equation modeling. *Journal of Statistical Software, 48*, 1-36. https://doi.org/10.18637/jss.v048.i02.

Rousseeuw, P. (1987). Silhouettes: a graphical aid to the interpretation and validation of cluster analysis. *Computational and Applied Mathematics, 20*, 53-65. https://doi.org/10.1016/0377-0427(87)90125-7.

Sauer, S., Walach, H., Schmidt, S., Hinterberger, T., Lynch, S., Büssing, A., & Kohls, N. (2013). Assessment of mindfulness: review on state of the art. *Mindfulness, 4*, 3-17. https://doi.org/10.1007/s12671-012-0122-5.

Segal, Z. V., Williams, J. M. G., & Teasdale, J. D. (2013). *Mindfulness-based cognitive therapy for depression* (2nd ed.). New York: Guilford Press.

Taylor, N. Z., & Millear, P. M. R. (2016). Validity of the Five Facet Mindfulness Questionnaire in an Australian, meditating, demographically diverse sample. *Personality and Individual Differences, 90*, 73-77. https://doi.org/10.1016/j.paid.2015.10.041.

Van Dam, N. T., Earleywine, M., & Danoff-Burg, S. (2009). Differential item function across meditators and non-meditators on the Five Facet Mindfulness Questionnaire. *Personality and Individual Differences, 47*, 516-521. https://doi.org/10.1016/j.paid.2009.05.005.

Veehof, M. M., Peter, M., Taal, E., Westerhof, G. J., & Bohlmeijer, E. T. (2011). Psychometric properties of the Dutch Five Facet Mindfulness Questionnaire (FFMQ) in patients with fibromyalgia. *Clinical Rheumatology, 30*, 1045-1054. https://doi.org/10.1007/s10067-011-1690-9.

Williams, M. J., Dalgleish, T., Karl, A., & Kuyken, W. (2014). Examining the factor structures of the Five Facet Mindfulness Questionnaire and the Self-Compassion Scale. *Psychological Assessment, 26*, 407-418. https://doi.org/10.1037/a0035566.

PART II

The mutual support model of mindfulness and character strengths

Dandan Pang and Willibald Ruch

Pang, D., & Ruch, W. (2019). The mutual support model of mindfulness and character strengths. *Mindfulness*. Advance online publication. doi:10.1007/s12671-019-01103-z

Open Access available at

https://link.springer.com/content/pdf/10.1007%2Fs12671-019-01103-z.pdf

Abstract

Objectives: Numerous studies have confirmed robust relationships between general well-being and mindfulness or character strengths respectively, but few have examined associations between mindfulness and character strengths. Two studies were carried out to explore these relationships comprehensively in the framework of the Values in Action (VIA) classification of character strengths. Methods: In Study 1, participants (N = 1,335) completed validated assessments of mindfulness and character strengths, and the relationship between the two was investigated in a broad online sample. In Study 2, the effect of a mindfulness training on specific character strengths was investigated using a randomized-control design (N = 42). Results: The results of Study 1 confirmed positive relationships between mindfulness and character strengths and further identified a list of character strengths that might overlap with mindfulness—i.e., creativity, curiosity, open-mindedness, love of learning, perspective, bravery, perseverance, zest, love, social intelligence, forgiveness, self-regulation, appreciation of beauty, gratitude, hope, and spirituality. The findings of Study 2 provided further support for the hypothesis that mindfulness training could help cultivate certain character strengths. Compared to participants in the waitlist-control condition, those who attended an 8-week mindfulness-based training program showed significant increases in the strengths of love, appreciation of beauty, gratitude, and spirituality, and a trend towards significant increases in the strengths of zest and bravery. Conclusions: The results provide initial evidence for a mutual support model of mindfulness and character strengths.

Keywords: character strengths; mindfulness; MBSR; positive psychology; VIA classification

Introduction

Mindfulness describes a particular way of paying attention to the present moment without judgment (Kabat-Zinn 1994). In less than 40 years, it has become a booming area of scientific research in psychology. In recent years, there has been a spate of particular interest in implementing mindfulness in the specific context of positive psychology (e.g., Baer 2015; Baer and Lykins 2011; Ivtzan and Lomas 2016; Malinowski 2013). Known as the science of well-being, positive psychology (Seligman and Csikszentmihalyi 2000), focuses on promoting human potential (Sheldon and King 2001). Its central tenet is that mental health is more than the absence of pathology or distress (as already noted by Marie Jahoda in 1958); therefore, psychological science should also investigate how individuals and communities can flourish and thrive (Peterson 2006).

As one of the original "three pillars" of positive psychology (Seligman 2002), character strengths, together with virtues, has developed into a fast-growing research topic in psychology during the past decade. Character strengths are a family of positive personality traits that are morally and positively valued but have been neglected within personality psychology despite empirical overlaps between character and personality traits, such as agreeableness and conscientiousness (Macdonald et al. 2008). Peterson and Seligman (2004) proposed a comprehensive system of positive traits, labeled the Values in Action (VIA) classification of character strengths. These efforts represented "new attention paid to adaptive, constructive and growth-oriented aspects of personality" (McCrae 2011, p. 196). As one of the most comprehensive structure of character, the VIA classification identified 24 character strengths and categorized them into six virtues, which were considered universal across time and different cultures (e.g., Dahlsgaard et al. 2005).

Existing research on the overlap between personality traits and dispositional mindfulness or mindfulness meditation has primarily focused on either the five-factor model of personality or "Big 5" (McCrae and Costa 1987; McCrae and John 1992) or the

"psychobiological" model of personality with an emphasis on the character profile (Cloninger et al. 1993). For example, a recent meta-analysis synthesized findings from 32 samples in 29 studies and confirmed that trait mindfulness correlated negatively with neuroticism but positively with conscientiousness (Giluk 2009). A cross-sectional study (van den Hurk et al. 2011) revealed that mindfulness-meditators showed higher scores of openness but lower scores of conscientiousness than non-meditators. They also found that the practice of mindfulness meditation was negatively related to neuroticism and positively related to openness and extraversion.

The psychobiological model of personality consists of three dimensions that constitute the character profile: (1) self-directedness, which maps onto concepts such as self-esteem and self-efficacy; (2) cooperativeness, which expresses the capacity to be empathic, tolerant, and compassionate; and (3) self-transcendence, which measures the tendency toward spirituality and creativeness (Crescentini and Capurso 2015). A variety of studies have investigated the relationships between mindfulness and positive traits, such as the character component of the psychobiological model of personality. For example, after an eight-week program of mindfulness meditation, participants in an experimental group scored higher in all three aspects of the character profile, while no changes were found in the control group (Campanella et al. 2014). Advanced meditators who had more than two years of meditation experience scored higher in all three aspects of the character profile compared to naïve subjects (Crescentini and Capurso 2015; Haimerl and Valentine 2001).

Much less is known about the overlap between mindfulness and the VIA classification of character strengths, although numerous studies have independently demonstrated the benefits of mindfulness and character strengths (e.g., Grossman et al. 2004; Sin and Lyubomirsky 2009). Given the empirical overlap of VIA character strengths with the Big 5 (e.g., Macdonald et al. 2008), as well as the conceptual connections with the character profile (Crescentini and Capurso 2015), it is natural to assume that mindfulness and character

strengths (as viewed within the VIA framework) are intimately associated. The first link between mindfulness and character strengths is the similarity in their functions. Peterson and Seligman (2004) described how character strengths can contribute to a more fulfilling life, which was in accordance with the general idea behind mindfulness in the Buddhist tradition, in which Buddha also searched for meaning and happiness (Garfinkel 2007). This association has been confirmed by extant evidence on the robust relationships between mindfulness and character strengths with well-being (for overviews, see e.g., Bruna et al. 2018; Eberth and Sedlmeier 2012).

Second, a closer look at the definitions of the two constructs also unveils similarities. Researchers had devoted to establishing a consensus on the conceptualization of mindfulness and eventually came up with a mutually agreed operational definition: "mindfulness involves the *self-regulation* of attention with an approach of *curiosity*, *openness* and *acceptance*" (Bishop et al. 2004). In this definition, one could easily relate the character strengths of curiosity, open-mindedness, and self-regulation to mindfulness.

Third, this overlap is apparent regarding the nature of how people practice and master mindfulness. The idea that mindfulness can be cultivated through meditation exercises (Hanh 1975; Kabat-Zinn 1990, 1994; Linehan 1993), especially Buddhist-based meditations, is an essential part of Eastern philosophies (Feuerstein 2001). Many mindfulness meditations have a wisdom component, such as promoting a "wise mind" (Linehan 1993) and "wisdom meditation" (Kristeller 2003). Therefore, positive correlations can be expected to exist between mindfulness and character strengths assigned to the virtue of wisdom (creativity, curiosity, love of learning, open-mindedness, and perspective). Since several mindfulness-based programs (such as mindfulness-based stress reduction [MBSR]; Kabat-Zinn 1982) have helped patients with chronic pain, the strengths of bravery, perseverance, and self-regulation could also be related to mindfulness. Mindfulness exercises require us to keep our attention alive to the present moment (Hanh 1975), which means keeping enthusiasm and energy for

the here and now. This in turn leads to a positive association between mindfulness meditations and zest. The observing component of mindfulness emphasizes the importance of observing, noticing, or attending to a variety of stimuli, which is also critical for the strength of appreciation of beauty.

Despite the theoretical linkage between mindfulness meditations and character strengths, few empirical studies have investigated their interconnections. Their results were considered piecemeal (e.g., studies focused on one strength), indirect, or non-inclusive (Niemiec 2014). According to Baer and Lykins' (2011) summary, mindfulness (e.g., mindfulness-based intervention) was associated with increased curiosity, openness to experience, vitality, emotional intelligence (related to social intelligence), self-regulation, optimism/hope and states of transcendence (especially spirituality). However, they also pointed out the need for additional empirical examinations of these relationships. Two recent studies (Duan 2016; Duan and Ho 2018) showed that two components of dispositional mindfulness (observing and non-judging) were related to individual strengths. Using the Brief Strength Scale (Ho et al. 2016), which categorized strengths into three types (interpersonal, intellectual, and temperance strengths), the authors provided an overview of the relationships between facets of dispositional mindfulness and strengths. However, the mechanisms depicted in the studies could be mixed since the strengths were grouped. To capture the relationship with full pictures of individual strengths, more comprehensive measures and variant samples are required.

In sum, the two studies presented here attempt to derive, both theoretically and empirically (from preliminarily results), a list of character strengths that could potentially relate to mindfulness: i.e., creativity, curiosity, open-mindedness, love of learning, perspective, bravery, perseverance, zest, social intelligence, self-regulation, appreciation of beauty, hope, and spirituality. To date, no study has examined the relationships between mindfulness and character strengths within the VIA classification framework. A mutual

support model of mindfulness and character strengths is proposed and initially tested in the present study. It is assumed that the link between mindfulness and character strengths will be bidirectional. That is, certain character strengths will facilitate the practice of mindfulness, while mindfulness through practice will have an impact on the cultivation of certain character strengths.

Study 1

The aim of Study 1 was to investigate the overlap between mindfulness and character strengths using comprehensive measures and a broad sample. First, it was hypothesized that certain character strengths as mentioned in the introduction (i.e., creativity, curiosity, open-mindedness, love of learning, perspective, bravery, perseverance, zest, social intelligence, self-regulation, appreciation of beauty, hope, and spirituality) would correlate with the five facets and the total score of mindfulness. Second, it was hypothesized that participants currently practicing mindfulness meditation would score higher in those character strengths compared to participants with no mindfulness experience.

Methods

Participants

A total of 1,471 participants completed a set of online questionnaires on mindfulness and character strengths. A preliminary analysis resulted in the removal of the data from 136 participants for the following reasons: (1) seven participants rated at least 80% of the questionnaires with the same value; (2) thirty-seven participants claimed to have no meditation experience but at the same time reported themselves as practicing meditation regularly or irregularly; (3) ninety-two meditators reported that they did not practice Buddhist-based meditation or Christian practices (e.g., yoga, tai chi, or prayer), or did not specify their meditation type. The final sample consisted of 1,335 German-speaking volunteers (349 men, 986 women) aged between 18 and 79 years ($M = 42.5$, $SD = 12.0$). Most

participants were from Germany (65%), with smaller numbers from Switzerland (23.7%), and Austria (8.5%). More than half of the participants had a university degree or were currently studying (63.7%). In addition, participants' experience of meditation was measured following the procedure adapted from Baer et al. (2008). They were asked if they had any previous meditation experience before with three possible responses: (1) Yes, I currently meditate; (2) Yes, but it was a while ago; or (3) No, I don't have any experiences with meditation. Based on their answers, participants were split into two different groups: (1) the current meditators (i.e., those who selected the first option; $n = 437$), and (2) the non-meditators (i.e., those who selected the third option; $n = 429$). The two samples differed significantly in their age, $t(1, 864) = 9.00$, $p < .001$, but the proportion of men and women ($\chi^2[1]=1.36$, $p =.243$) and their education level ($\chi^2[4]=4.89$, $p =.298$) did not differ between the two groups.

Procedure

Participants were requested to complete the questionnaires on a website (www.charakterstaerken.org; hosted by the Section on Personality and Assessment of the University of Zurich) for research purposes between May 2015 and February 2017. The website was promoted by various means to obtain a heterogeneous sample; these included press coverages, publishing the link online, and contacting specific groups. The volunteers registered on the website from their personal computers and completed the questionnaires online. Respondents were not paid for participating but were provided with an automatically generated feedback of their individual results. The procedure was conducted in accordance with the guidelines of the Ethics Committee of the Department of Psychology at the University of Zurich.

Measures

Mindfulness. The Five Facet Mindfulness Questionnaire (FFMQ; Baer et al. 2006) is a self-report instrument consisting of 39 items. Respondents use a five-point scale to rate their

dispositional mindfulness with five facets: observing, describing, acting with awareness, non-judging of experience, and non-reacting. A sample item for the facet of describing is: "I'm good at finding words to describe my feelings." In the present study, the German version of the questionnaire was used (FFMQ-D; Michalak et al. 2016). Satisfactory internal consistencies were found for all three samples and all five facets. Cronbach's α ranged from .76 to .92 (Median = .87).

Character Strengths. The Values in Action Inventory of Strengths (VIA-IS; Peterson et al. 2005) is a self-report questionnaire consisting of 240 items that measure the 24 character strengths of the VIA classification. A sample item for the strength of perseverance is: "I never quit a task before it is done." In the current study, the German version of the VIA-IS was used (Ruch et al., 2010), which showed high reliability across all samples. Cronbach's α ranged from .71 to .89 (Median = .79).

Data Analyses

First, Spearman's rank correlation was conducted between the five facets as well as the total score of mindfulness and the 24 character strengths because several facets of mindfulness (i.e., observing, describing, and non-judging) and several scales of character strengths (e.g., curiosity) were excessively skewed. Age, gender, and education were controlled to partial out the minor sources of variance within the sample, although doing so did not alter the findings.

An independent samples *t*-test was conducted to explore the differences in mindfulness and character strengths between the current meditators and the non-meditators. Because the two samples differed significantly in age (those who are older are more likely to have a longer experience of mindfulness practice), a case-control match using SPSS software was conducted before further comparisons (matching variable: age; tolerance value: 1). After matching, two samples that no longer differed in age were obtained: (1) the current meditators (n = 316, M_{age}

= 42.9); and (2) the non-meditators (n = 316, M_{age} = 43.2). Subsequently, standardized effect sizes were calculated using Cohen's *d* (Cohen 1988).

Results

Overlap of mindfulness and character strengths

The results of the descriptive statistics and the correlations between the five facets as well as the total score of mindfulness and the 24 character strengths are displayed in Table 1. As shown in Table 1, almost all mindfulness facets and the total score of mindfulness correlated positively with the character strengths when demographics (age, gender, and education) were controlled. The character strengths of hope, bravery, curiosity, social intelligence, zest, love, perspective, gratitude, self-regulation and creativity displayed medium effect correlations with at least one facet of mindfulness and the total score of mindfulness. In contrast, modesty and prudence were either negatively correlated or unrelated to mindfulness. In addition, despite a lower correlation with the total score of mindfulness, forgiveness ($r_{non\text{-}reacting}$ = .32, p < .001), perseverance ($r_{awareness}$ = .33, p < .001), open-mindedness ($r_{describing}$ = .30, p < .001) and appreciation of beauty ($r_{observing}$= .46, p < .001) correlated positively with one facet of mindfulness but not the remaining facets. All p values were corrected using the Bonferroni method.

Table 1. *Descriptive Statistics and Correlations Between Mindfulness and the 24 Character Strengths Controlled for Age, Gender, and Education.*

			FFMQ					
VIA-IS	*M*	*SD*	OB	DS	AW	NJ	NR	TOT-M
Hope	3.54	0.61	.24***	.28***	**.34***	**.35***	**.45***	**.48***
Bravery	3.60	0.53	**.32***	**.41***	**.33***	.27***	**.38***	**.48***
Curiosity	4.01	0.52	**.36***	.29***	.25***	.31***	**.37***	**.45***
Social intelligence	3.77	0.49	**.35***	**.45***	.29***	.18***	**.33***	**.44***
Zest	3.51	0.59	.27***	.27***	**.33***	**.31***	**.37***	**.44***
Love	3.88	0.55	.26***	**.38***	.26***	.24***	.26***	**.39***
Perspective	3.63	0.49	.23***	**.35***	.28***	.23***	**.32***	**.39***
Gratitude	3.84	0.55	**.40***	.23***	.22***	.18***	.29***	**.36***

Table 2 continued

Table 2 continues

Self-regulation	3.28	0.57	.20***	.17***	.35***	.18***	**.31****	**.33****
Creativity	3.59	0.67	**.34****	.25***	.13***	.16***	.23***	**.30****
Humor	3.52	0.63	.23***	.18***	.16***	.17***	.29***	.29***
Love of Learning	3.94	0.58	.29***	.22***	.13***	.17***	.24***	.29***
Forgiveness	3.58	0.55	.15***	.12***	.18***	.22***	**.32****	.28***
Leadership	3.72	0.50	.18***	.24***	.17***	.15***	.27***	.28***
Spirituality	3.12	0.93	.27***	.19***	.16***	.14***	.23***	.28***
Perseverance	3.51	0.63	.14***	.21***	**.33****	.12***	.20***	.27***
Open-mindedness	3.94	0.49	.21***	**.30****	.19***	.07	.19***	.26***
Appreciation Beauty	3.61	0.57	**.46****	.16***	.03	.03	.12***	.21***
Honesty	3.85	0.44	.14***	.13***	.21***	.11***	.13***	.19***
Kindness	3.83	0.47	.23***	.18***	.10***	.04	.12***	.18***
Fairness	3.96	0.45	.15***	.09	.12***	.09	.16***	.16***
Teamwork	3.62	0.50	.07	.08	.10***	.09	.16***	.14***
Prudence	3.45	0.56	.08	.09	.12***	-.01	.09	.09
Modesty	3.23	0.56	-.06	-.20***	-.02	-.05	-.01	-.10***
M			3.69	3.78	3.36	3.64	3.15	3.52
SD			0.60	0.74	0.66	0.85	0.71	0.51

Note. N = 1,335. *M*= Mean; *SD* = standard deviation. VIA-IS = Values in Action Inventory of Strengths. FFMQ = Five Facet Mindfulness Questionnaire. Beauty = Appreciation of beauty and excellence. OB = Observing; DS = Describing; AW = Awareness; NJ = Non-judging; NR = Non-reacting; TOT-M = Total score of mindfulness. Age, gender, and education were controlled to partial out the minor sources of variance within the sample, although doing so did not alter the findings. The order is sorted by the size of correlations with the total score of mindfulness. Correlations that were equal or larger than .30 were bold. Results with three asterisks (***) indicate statistical significance using the Bonferroni corrections ($p < .0003$) for multiple comparisons (144 tests).

Next, an independent samples *t*-test was conducted to investigate the differences between the current meditators and the non-meditators (after matching their age) regarding their mindfulness level and character strengths. The results are displayed in Table 2. Significant differences were found between the two matched samples for all five facets of mindfulness and certain character strengths. As shown in Table 2, spirituality showed a large effect size, while gratitude, appreciation of beauty, curiosity, and love of learning displayed medium effect sizes, indicating that the current meditators scored higher on those character strengths than the non-meditators. Despite not reaching statistical significance after Bonferroni corrections, the current meditators showed a tendency to score higher in strengths of leadership, zest, perspective, self-regulation, and humor. In contrast, the strengths of kindness, perseverance, fairness, open-mindedness, teamwork, and prudence showed no

difference between the two groups, while strengths of honesty and modesty showed a tendency in the opposite direction.

Table 2. *Mean Differences of Mindfulness and Character Strengths between the Current Meditators and the Non-meditators after Matching Age.*

	Current meditators		Non-meditators		Difference		Effect size
Measures	*M*	*SD*	*M*	*SD*	*t* (630)	*p*	Cohen's *d*
FFMQ							
Observing	3.93	0.52	3.46	0.62	10.33	<.001[a]	0.82
Non-reacting	3.40	0.69	2.94	0.68	8.28	<.001[a]	0.66
Describing	4.01	0.66	3.65	0.78	6.32	<.001[a]	0.51
Non-judging	3.88	0.81	3.51	0.84	5.72	<.001[a]	0.46
Awareness	3.51	0.66	3.27	0.65	4.60	<.001[a]	0.37
TOT-M	3.75	0.48	3.37	0.48	9.90	<.001[a]	0.79
VIA-IS							
Spirituality	3.66	0.82	2.69	0.89	14.24	<.001[a]	1.13
Gratitude	4.01	0.53	3.67	0.56	7.85	<.001[a]	0.62
Appreciation Beauty	3.75	0.52	3.44	0.59	6.95	<.001[a]	0.56
Love of Learning	4.08	0.53	3.77	0.63	6.62	<.001[a]	0.53
Curiosity	4.16	0.47	3.9	0.56	6.37	<.001[a]	0.50
Forgiveness	3.68	0.53	3.46	0.55	5.09	<.001[a]	0.41
Love	3.99	0.53	3.78	0.59	4.55	<.001[a]	0.38
Creativity	3.71	0.67	3.47	0.72	4.30	<.001[a]	0.35
Hope	3.66	0.59	3.47	0.65	3.86	<.001[a]	0.31
Bravery	3.71	0.52	3.55	0.56	3.72	<.001[a]	0.30
Social intelligence	3.85	0.47	3.70	0.52	3.73	<.001[a]	0.30
Leadership	3.78	0.50	3.64	0.51	3.37	.001[a]	0.28
Zest	3.60	0.59	3.45	0.60	3.13	.002	0.25
Perspective	3.71	0.48	3.60	0.52	2.76	.006	0.22
Self-regulation	3.36	0.58	3.24	0.59	2.60	.010	0.21
Humor	3.58	0.64	3.46	0.67	2.27	.024	0.18
Kindness	3.86	0.47	3.80	0.51	1.51	.131	0.12
Perseverance	3.51	0.65	3.55	0.64	-0.87	.386	0.06
Fairness	3.95	0.45	3.93	0.43	0.71	.478	0.05
Open-mindedness	3.95	0.47	3.93	0.51	0.49	.622	0.04
Teamwork	3.59	0.49	3.59	0.50	0.06	.955	0.00
Prudence	3.43	0.59	3.44	0.57	-0.19	.853	-0.02
Honesty	3.82	0.44	3.91	0.43	-2.51	.012	-0.21
Modesty	3.15	0.57	3.27	0.59	-2.60	.010	-0.21

Note. $n = 316$ for each group. *M* = Mean; *SD* = Standard Deviation. TOT-M = Total score of mindfulness. Appreciation Beauty = Appreciation of beauty and excellence. For all measures, higher means indicate higher scores. The order is sorted by the effect size Cohen's *d*. [a] Results with the superscript indicate statistical significance using the Bonferroni correction ($p < .0017$) for multiple comparisons (30 tests).

Discussion

Combining the results of Table 1 and Table 2, a list of character strengths that were considered to be overlapping with mindfulness and its facets were derived; i.e., creativity, curiosity, open-mindedness, love of learning, perspective, bravery, perseverance, zest, love, social intelligence, forgiveness, self-regulation, appreciation of beauty, gratitude, hope and spirituality. These were the strengths that correlated with mindfulness or at least one facet of mindfulness with medium to large effect sizes or were notably different between the current meditators and the non-meditators (with medium to large effect sizes). Based on these results,

as well as the theoretical connections between the two as mentioned in the introduction, a mutual support model of mindfulness and character strengths (Fig. 1) was proposed. The model assumes that certain character strengths (e.g., curiosity) facilitate mindfulness; i.e., people with these character strengths are more willing to try mindfulness meditations (Path A). Conversely, the mastery of mindfulness is assumed to enhance certain character strengths, such as spirituality (Path B). However, because of the nature of a cross-sectional study, no causality or direction could be derived from the current results; i.e., which character strengths belong to Path A, and which belong to Path B. Therefore, an intervention study with a control group was conducted to find out exactly which character strengths might be enhanced through a mindfulness training (Path B).

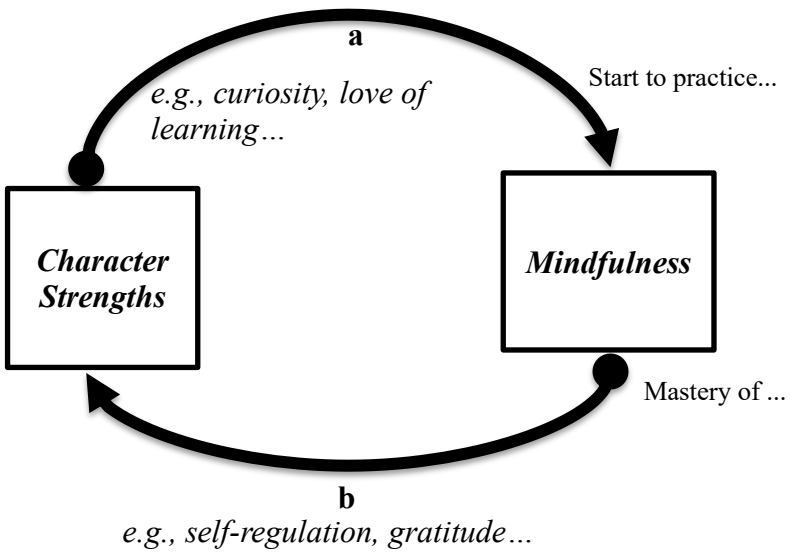


Figure 1. The proposed mutual support model of mindfulness and character strengths.

Study 1 produced a list of character strengths that seemed to overlap with mindfulness and resulted in the proposal of a mutual support model of mindfulness and character strengths (see Fig. 1). However, the model could not be tested with a cross-sectional design. In Study 2, the aim was to test whether character strengths suggested by Study 1 could be enhanced through a mindfulness training, and therefore evidence Path B in the mutual support model.

Study 2

Study 1 produced a list of character strengths that seemed to overlap with mindfulness, and resulted in the proposal of a mutual support model of mindfulness and character strengths (see Fig. 1). However, the model could not be tested with a cross-sectional design. In Study 2, the aim was to test whether character strengths suggested by Study 1 could be enhanced through a mindfulness training, and therefore determine the Path B in the mutual support model.

Methods

Participants

To be eligible to take part, participants in the study had to meet the following criteria: (a) they were adults aged 18 years or older; (b) they had no previous meditation experience; (c) their level of employment ≥ 50%; and (d) they were neither attending psychotherapeutic treatment nor using psychotropic/illegal drugs throughout the duration of the study. Eighty-Six volunteers signed up for participation in the study through a web link via the Unipark platform, where they completed a screening and their demographic details. A total number of 63 participants from various areas of employment were randomly assigned to three different conditions: (1) Mindfulness-Based Strengths Practice (MBSP; Niemiec 2013; $n = 21$); (2) Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn 1982; $n = 21$); and (3) waitlist-control condition (WL; $n = 21$). *In the present study, we focused on the participants of two conditions: MBSR vs. WL to answer our specific research question.* The randomization was constrained because of the limited availability of some participants; their group was adjusted accordingly. However, this would not impact our randomization because the participants did not know to which conditions they were assigned. They were all informed that they would be participating in a mindfulness-based training without knowing the details of the training.

Procedure

To promote the study, e-mails were sent to potential target groups, such as HR professionals; the e-mails also included instructions on how to participate. In addition, the study was advertised by various means through the Internet, such as online forums and social media platforms, as well as different mailing lists. To motivate participants and reduce dropout, all participants were asked to pay 100 CHF to attend the interventions and were given individual feedback as an incentive. The procedure was approved by the Ethics Committee of the Department of Psychology at the University of Zurich.

After registration and filling out the baseline measures, participants in the experimental condition gathered once a week for eight consecutive weeks and received a two-hour version of the standard MBSR training, without the retreat that is proposed in the manual of the MBSR curriculum. The trainer was a qualified MBSR teacher who had more than two years of experience in leading MBSR group at the time of the intervention. Participants in the MBSR conditions were asked to complete homework between each session. This consisted of a 20-40-minute session on a daily basis, which required them to repeat certain mindfulness practices using handouts and audio tapes. For the control condition, participants were recruited in the same way as the experimental condition, with an invitation to participate in a mindfulness-based training. However, they were later informed that the current program was fully booked, and they would have to wait a year to attend the next intervention. They were asked to fill out the instruments as well as pay the fee, and the role of the wait list control was explained in the process.

Data were collected online via the Unipark survey platform. E-mail reminders to fill out the questionnaires were sent to participants at the relevant intervals. All participants were asked to complete the same questionnaires at five intermittent points; that is: (1) before the eight-week intervention (Month 0); (2) one week after the intervention (Month 2); (3) one month after the intervention (Month 3); (4) three months after the intervention (Month 5); and (5) six months after the intervention (Month 8). Fig. 2 displays the detailed schedule of the

data collection. Participants also reported how often they completed the suggested homework on average on a 6-point scale, both throughout and after the intervention. Data collection lasted through April 2017; the study concluded when participants completed their six-month follow-up assessment.

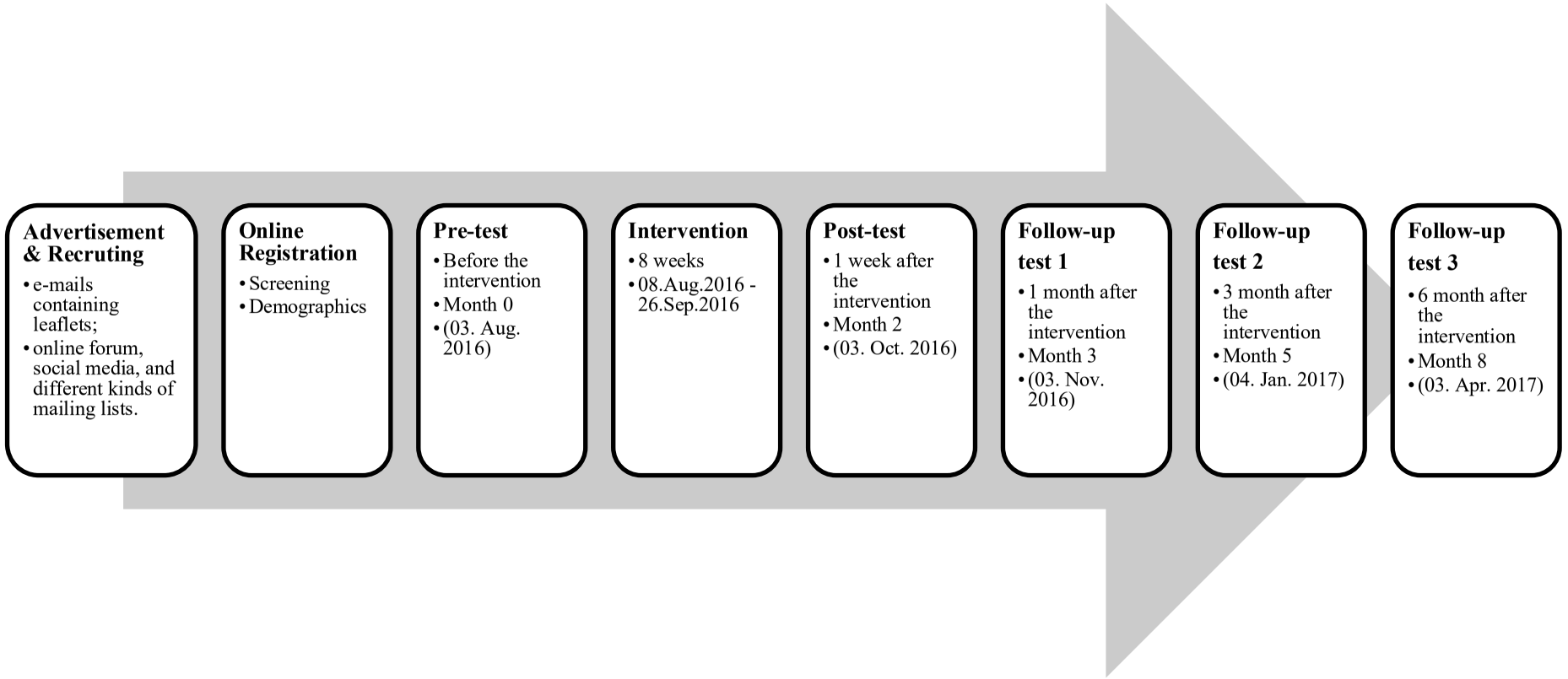


Figure 2. Timeline of the data collection in Study 2. The date in brackets were the time points when the E-mail reminders were sent to participants to fill out the questionnaires.

Measures

Mindfulness and Character Strengths. The same instruments described in Study 1 were used to measure mindfulness and character strengths; namely, the Five Facet Mindfulness Questionnaire (FFMQ; Baer et al. 2006) and the Values in Action Inventory of Strengths (VIA-IS; Peterson et al. 2005).

Data Analyses

A series of linear mixed-effects models were applied, modeling changes over time in participants' mindfulness (i.e., the total score) and character strengths as suggested by Study 1 (i.e., creativity, curiosity, love of learning, perspective, bravery, zest, love, social intelligence, self-regulation, appreciation of beauty, gratitude, hope, and spirituality). The change in the total score of mindfulness serves as an important manipulation check for the MBSR training, and the changes in the character strengths serve as the primary outcomes for the effectiveness of the MBSR. The R package "lme4" (Bates et al. 2015) was used to conduct the analysis, which was based on the restricted maximum likelihood estimation (REML). The time variable (month) was split into two different phases: (1) from baseline until one week after the intervention (i.e., Months 0–2; the acute intervention phase); and (2) from one week after the intervention until the six-month follow-up test (i.e., Months 2–8; the follow-up phase). The time variable was dummy coded into two variables: Time1 (0, 2, 2, 2, 2) and Time2 (0, 0, 3, 5, 8) to represent the different time periods. The statistical model can be summarized as follows:

$$Y_{ij} = [\gamma_{00}+\gamma_{01}Condition_j+\gamma_{10}Time1_{ij}+\gamma_{11}Condition_j * Time1_{ij}+\gamma_{20}Time2_{ij}+ \gamma_{21}Condition_j * Time2_{ij}] + [U_{1j} * Time1_{ij}+U_{2j} * Time2_{ij} + U_{0j} + R_{ij}]$$

where,

$$R_{ij} \sim \mathrm{N}\,(0, \sigma_R{}^2) \text{ and } \begin{Bmatrix} U_{0j} \\ U_{1j} \\ U_{2j} \end{Bmatrix} \sim \mathrm{N} \begin{Bmatrix} 0 & \tau_{00} & \tau_{01} & \tau_{02} \\ 0, & \tau_{10} & \tau_{11} & \tau_{12} \\ 0 & \tau_{20} & \tau_{21} & \tau_{22} \end{Bmatrix}$$

Y_{ij} refers to the scores of mindfulness or character strengths at all measurement time points. The training effect was evaluated by examining the Time1*Condition interaction (γ_{11}) and Time2*Condition interaction (γ_{21}), which reflects group differences in changes from pre-test to post-test and from post-test to follow-up tests, respectively. Missing values were handled by using the multiple imputation (MI) procedure to conduct intent-to-treat analyses. By applying the R package "Amelia" (Honaker et al. 2011), missing data were imputed for each condition at each time point using the Expectation Maximization (EM) algorithm. This process was repeated 50 times to produce 50 complete datasets where the observed values were the same, and the unobserved values were drawn from their posterior distributions. Effectiveness analyses were then performed on each of the 50 resulting data files, and the 50 estimates were pooled into a single overall estimate using the MI inference rules of "smallsample" (Barnard and Rubin 1999). This method adjusts degrees of freedom for small samples and yields proper *p* values and confidence intervals for the estimates (R package "mice"; Van Buuren and Groothuis-Oudshoorn 2011). Using MI allows a test of whether the same pattern of results would have emerged if dropouts had completed the study.

The effect of mindfulness training on mindfulness and character strengths was evaluated by examining the significant difference between the rates of change (slope) in the scores of character strengths for the experimental condition (MBSR) in comparison with the control condition (WL). That is, the effect was evaluated by examining the Time1*Condition interaction (whether certain character strengths indeed increased after the mindfulness training) and Time2*Condition interaction (whether the increase in certain character strengths changed in the follow-up phase).

Results

No significant baseline differences were detected across the two conditions for mindfulness and all the character strengths that were suggested by Study 1 [$t(40)$ ranged from -1.17 to 0.69, all $p > .10$]. Around 80% of the participants were retained at the six-month

follow-up test. There were no significant differences based on completion status for the baseline measure, and the dropout rates did not differ across conditions [$\chi^2(1) = 0.141$, p =.701]. No differences in mindfulness and characters strengths were found between participants who dropped out and those who completed the study [$t(40)$ ranged from -1.06 to 1.90, all $p > .05$]. Participants in the intervention condition reported continued engagement with homework throughout the MBSR training and after the MBSR training ended. During the intervention, all participants (100%) reported practicing homework on average once a week or more. When the training was over, still around half of the participants (47.7%) still reported continuing to practice homework once a week or more until six months later.

The results of the descriptive data (means and standard deviations) can be found in Table 3 (using completers' data), and the results of the piecewise linear mixed-effects model are given in Table 4 (using both completers' and MI data). As shown in Table 4, there were no time effects for all models (after Bonferroni corrections), indicating that participants in the WL condition did not change in their ratings of mindfulness and character strengths over time (both Time1 and Time2), in line with expectations. Only appreciation of beauty and gratitude showed a trend towards a Time1 effect, while love and gratitude showed a trend towards a Time2 effect; this means that caution should be warranted when interpreting the interaction effects on those outcomes.

There was a significant increase (after Bonferroni corrections) in the total score of mindfulness, indicating that the MBSR training was effective in enhancing participants' dispositional mindfulness. Of the proposed list of character strengths that were considered to overlap with mindfulness, the following character strengths showed significant condition effects from pre-test to post-test (i.e., when evaluated by examining the Time1*Condition interaction). Compared to the WL, participants in the MBSR condition showed significant increases in love ($\beta = .19$, $p < .001$), appreciation of beauty ($\beta = .21$, $p < .001$), gratitude ($\beta = .23$, $p < .001$) and spirituality ($\beta = .26$, $p < .001$). They also showed a trend toward

significant increases in zest ($\beta = .17$, $p < .05$) and bravery ($\beta = .12$, $p < .05$), when taking multiple comparisons into consideration. The results for the strength – appreciation of beauty – warrant caution due to the fact that the WL showed a decreasing trend over the same period. In contrast, the following character strengths did not show significant condition effects (after Bonferroni corrections), i.e., creativity, curiosity, open-mindedness, love of learning, perspective, perseverance, social intelligence, forgiveness, self-regulation, and hope, indicating that those strengths were not changed after an eight-week MBSR training.

After the mindfulness training, the majority of the strengths that were enhanced had not declined six months after the intervention. The exceptions were love and gratitude, which showed a trend toward slight decreases at the follow-up tests. The declining trend of these two strengths for the MBSR group over Time2 might be traced back to the increasing trend of the two strengths for the WL group over Time2. The results of the intention-to-treat analyses using the MI dataset showed a similar pattern. The effects were less statistically significant in some models based on imputed data, which is probably due to anomalies produced by MI when dealing with skewed data. All the estimates obtained from the completers' datasets fell within the 95% confidence intervals of the imputed estimates, which showed that comparable results would have been obtained if there had been no dropouts over time.

Table 3. *Descriptive Data of the Two Conditions at the Five Time Periods for Mindfulness and Character Strengths*

		Pre-test			Post-test			1-month FU			3-month FU			6-month FU		
Measures		*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
Mindfulness (TOT-M)	MBSR	21	3.23	0.51	18	3.66	0.33	18	3.66	0.32	17	3.67	0.36	18	3.69	0.34
	WL	21	3.18	0.46	17	3.18	0.38	16	3.28	0.39	16	3.19	0.56	16	3.32	0.53
Creativity	MBSR	21	3.26	0.77	18	3.46	0.55	18	3.50	0.74	17	3.38	0.78	18	3.44	0.76
	WL	21	3.52	0.70	16	3.49	0.64	16	3.57	0.66	16	3.56	0.52	16	3.53	0.61
Curiosity	MBSR	21	3.73	0.53	18	3.94	0.41	18	3.97	0.40	17	3.93	0.37	18	3.91	0.52
	WL	21	3.84	0.61	16	3.71	0.53	16	3.84	0.54	16	3.71	0.49	16	3.71	0.53
Open-mindedness	MBSR	21	3.63	0.55	18	3.82	0.38	18	3.86	0.37	17	3.81	0.38	18	3.88	0.38
	WL	21	3.67	0.54	16	3.66	0.43	16	3.75	0.52	16	3.61	0.56	16	3.76	0.55
Love of learning	MBSR	21	3.45	0.70	18	3.57	0.64	18	3.52	0.61	17	3.59	0.58	18	3.54	0.54
	WL	21	3.60	0.44	16	3.48	0.47	16	3.51	0.43	16	3.53	0.36	16	3.46	0.44
Perspective	MBSR	21	3.42	0.50	18	3.61	0.38	18	3.64	0.44	17	3.56	0.33	18	3.65	0.33
	WL	21	3.40	0.41	16	3.33	0.45	16	3.37	0.46	16	3.34	0.46	16	3.41	0.49
Bravery	MBSR	21	3.41	0.43	18	3.59	0.37	18	3.73	0.41	17	3.61	0.37	18	3.71	0.42
	WL	21	3.39	0.69	16	3.34	0.59	16	3.43	0.64	16	3.44	0.71	16	3.46	0.52
Perseverance	MBSR	21	3.30	0.53	18	3.49	0.45	18	3.41	0.41	17	3.47	0.45	18	3.49	0.40
	WL	21	3.26	0.64	16	3.21	0.64	16	3.34	0.54	16	3.34	0.72	16	3.26	0.61
Zest	MBSR	21	3.32	0.52	18	3.64	0.46	18	3.68	0.45	17	3.52	0.47	18	3.60	0.47
	WL	21	3.46	0.71	16	3.33	0.71	16	3.36	0.69	16	3.24	0.76	16	3.43	0.63
Love	MBSR	21	3.72	0.44	18	3.93	0.39	18	4.03	0.48	17	3.85	0.51	18	3.94	0.52
	WL	21	3.80	0.64	16	3.61	0.63	16	3.66	0.51	16	3.76	0.59	16	3.81	0.57
Social Intelligence	MBSR	21	3.65	0.39	18	3.78	0.32	18	3.77	0.31	17	3.74	0.28	18	3.83	0.42
	WL	21	3.57	0.46	16	3.54	0.54	16	3.64	0.48	16	3.66	0.48	16	3.64	0.49
Forgiveness	MBSR	21	3.34	0.49	18	3.47	0.40	18	3.56	0.44	17	3.47	0.42	18	3.63	0.47
	WL	21	3.26	0.46	16	3.18	0.45	16	3.36	0.35	16	3.38	0.37	16	3.38	0.39
Self-regulation	MBSR	21	3.10	0.52	18	3.33	0.49	18	3.42	0.38	17	3.30	0.44	18	3.36	0.48
	WL	21	3.07	0.65	16	3.07	0.41	16	3.14	0.50	16	3.09	0.52	16	3.15	0.45
Appreciation of beauty	MBSR	21	3.36	0.60	18	3.66	0.51	18	3.61	0.48	17	3.61	0.59	18	3.63	0.49
	WL	21	3.42	0.66	16	3.25	0.68	16	3.24	0.61	16	3.31	0.64	16	3.39	0.62

Table 3 continued

Table 3 continues

		Pre-test			Post-test			1-month FU			3-month FU			6-month FU		
Measures		*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
Gratitude	MBSR	21	3.60	0.60	18	3.91	0.57	18	3.94	0.59	17	3.82	0.66	18	3.86	0.71
	WL	21	3.59	0.60	16	3.32	0.47	16	3.41	0.57	16	3.40	0.60	16	3.46	0.58
Hope	MBSR	21	3.27	0.58	18	3.61	0.53	18	3.55	0.56	17	3.55	0.56	18	3.62	0.68
	WL	21	3.36	0.66	16	3.30	0.65	16	3.34	0.57	16	3.17	0.71	16	3.28	0.57
Spirituality	MBSR	21	2.50	0.85	18	3.01	1.12	18	2.96	1.14	17	2.90	1.12	18	2.91	1.14
	WL	21	2.34	0.71	16	2.15	0.59	16	2.16	0.76	16	2.24	0.69	16	2.19	0.76

Note. TOT-M = Total score of mindfulness. FU = Follow-up test. *M* = Mean; *SD* = Standard Deviation. Appreciation Beauty = Appreciation of beauty and excellence. MBSR=Mindfulness Based Stress Reduction; WL=Waitlist Control. Pre=Right before the intervention; Post=1 week after the intervention; 1 month, 3 months, and 6 months=one month, three months, and six months after the intervention.

Table 4. *Linear Mixed-Effect Model Tests of Mindfulness and Character Strengths by Time and Condition Using Completers' and ITT Dataset*

		Completers' Dataset				ITT Dataset				
Measures	Model effect	*β*	*df*	*t*	*p*	*β*	*df*	*t*	*p*	95% CI
Mindfulness (TOT-M)	Time1	.01	39.49	0.22	.829	.00	149.31	0.06	.955	-0.09, 0.09
	Time2	.01	32.29	1.38	.178	.01	87.53	1.06	.294	-0.01, 0.04
	Time1* MBSR	.20**	38.96	3.54	.001[a]	.21**	157.71	3.19	.002[a]	0.08, 0.33
	Time2* MBSR	-.01	32.20	-0.75	.461	-.01	119.07	-0.61	.545	-0.05, 0.02
Creativity	Time1	.05	35.36	1.16	.254	.01	112.70	0.12	.908	-0.13, 0.14
	Time2	.01	32.71	0.55	.585	.00	62.60	0.05	.961	-0.04, 0.04
	Time1* MBSR	.06	34.88	1.05	.302	.10	141.76	1.07	.284	-0.08, 0.27
	Time2* MBSR	-.01	32.64	-0.71	.485	-.01	85.97	-0.23	.820	-0.06, 0.05
Curiosity	Time1	-.02	36.87	-0.41	.684	-.04	155.57	-0.80	.424	-0.15, 0.06
	Time2	.00	32.12	-0.44	.661	.00	73.75	-0.32	.750	-0.03, 0.02
	Time1* MBSR	.11	36.24	1.88	.069	.15*	166.23	2.05	.042	0.01, 0.30
	Time2* MBSR	.00	32.16	-0.21	.835	.00	82.91	0.00	.997	-0.04, 0.04
Open-mindedness	Time1	.00	40.00	0.05	.957	.00	123.41	0.08	.938	-0.10, 0.10
	Time2	.01	77.40	0.90	.372	.01	67.59	0.42	.675	-0.02, 0.03
	Time1* MBSR	.07	39.15	1.26	.216	.09	131.71	1.27	.207	-0.05, 0.23
	Time2* MBSR	.00	77.12	-0.26	.794	.00	82.69	-0.02	.987	-0.04, 0.04
Love of learning	Time1	.00	32.48	-0.01	.993	-.05	128.59	-0.85	.399	-0.17, 0.07
	Time2	.00	33.00	-0.43	.667	.00	73.02	-0.13	.898	-0.03, 0.03
	Time1* MBSR	.05	32.33	0.99	.330	.10	134.61	1.26	.210	-0.06, 0.27
	Time2* MBSR	.00	32.71	0.26	.796	.00	80.87	0.05	.964	-0.04, 0.04
Perspective	Time1	-.01	33.69	-0.39	.698	-.03	148.14	-0.72	.474	-0.12, 0.06
	Time2	.01	32.01	0.96	.344	.01	86.40	0.64	.526	-0.02, 0.03
	Time1* MBSR	.10	33.36	2.00	.054	.12	145.67	1.92	.057	0.00, 0.25
	Time2* MBSR	-.01	32.06	-0.46	.651	-.01	79.82	-0.31	.760	-0.04, 0.03

Table 4 continued

Table 4 continues

		Completers' Dataset				ITT Dataset				
VIA-IS	Model effect	*β*	*df*	*t*	*p*	*β*	*df*	*t*	*p*	95% CI
Bravery	Time1	.01	34.92	0.21	.835	-.01	105.62	-0.18	.856	-0.11, 0.09
	Time2	.01	32.14	1.54	.134	.01	71.11	0.81	.420	-0.02, 0.04
	Time1* MBSR	.12*	34.58	2.64	.012	.11	138.30	1.69	.093	-0.02, 0.25
	Time2* MBSR	.00	32.16	-0.36	.720	.00	93.63	-0.19	.851	-0.04, 0.04
Perseverance	Time1	.01	35.70	0.27	.793	-.01	123.61	-0.21	.837	-0.11, 0.09
	Time2	.02	32.39	1.67	.105	.02	87.09	1.02	.311	-0.02, 0.05
	Time1* MBSR	.07	35.39	1.34	.189	.11	139.25	1.52	.131	-0.03, 0.24
	Time2* MBSR	-.03	32.43	-1.94	.061	-.02	92.00	-1.07	.286	-0.07, 0.02
Zest	Time1	-.02	33.70	-0.42	.674	-.08	149.89	-1.34	.181	-0.20, 0.04
	Time2	.01	32.00	0.84	.407	.01	99.52	0.51	.612	-0.02, 0.04
	Time1* MBSR	.17*	33.47	2.65	.012	.24**	158.08	2.88	.004	0.07, 0.40
	Time2* MBSR	-.02	32.03	-1.20	.239	-.02	104.45	-0.66	.512	-0.06, 0.03
Love	Time1	-.07	66.04	-1.97	.053	-.08	123.61	-1.63	.106	-0.19, 0.02
	Time2	.03**	44.72	2.73	.009	.02	78.00	1.25	.217	-0.01, 0.05
	Time1* MBSR	.19***	64.53	3.91	<.001[a]	.19**	138.62	2.74	.007	0.05, 0.33
	Time2* MBSR	-.03*	44.78	-2.23	.031	-.02	101.32	-0.99	.323	-0.06, 0.02
Social Intelligence	Time1	.01	35.01	0.41	.688	.01	128.46	0.14	.887	-0.07, 0.09
	Time2	.01	32.00	1.64	.111	.01	90.74	0.78	.436	-0.01, 0.03
	Time1* MBSR	.03	34.79	0.60	.553	.05	130.34	0.81	.421	-0.07, 0.16
	Time2* MBSR	-.01	32.05	-0.63	.531	.00	82.80	-0.20	.846	-0.04, 0.03
Forgiveness	Time1	.00	37.40	0.09	.930	-.01	160.40	-0.21	.835	-0.12, 0.09
	Time2	.02	67.37	1.91	.061	.02	94.08	1.55	.126	-0.01, 0.05
	Time1* MBSR	.09	36.76	1.38	.176	.10	163.30	1.27	.205	-0.05, 0.24
	Time2* MBSR	-.01	65.77	-1.01	.318	-.01	100.05	-0.75	.454	-0.05, 0.02

Table 4 continued

Table 4 continues

		Completers' Dataset				ITT Dataset				
VIA-IS	Model effect	*β*	*df*	*t*	*p*	*β*	*df*	*t*	*p*	95% CI
Self-regulation	Time1	.03	34.35	0.64	.529	.00	148.46	0.06	.949	-0.11, 0.12
	Time2	.01	32.02	0.85	.402	.01	89.67	0.60	.549	-0.02, 0.04
	Time1* MBSR	.09	33.63	1.47	.151	.12	161.50	1.49	.137	-0.04, 0.27
	Time2* MBSR	-.01	32.05	-0.57	.576	-.01	107.77	-0.35	.730	-0.04, 0.03
Appreciation Beauty	Time1	-.08*	46.86	-2.27	.028	-.09	127.27	-1.61	.109	-0.21, 0.02
	Time2	.02*	86.07	2.13	.036	.02	80.59	1.00	.319	-0.02, 0.05
	Time1* MBSR	.21***	46.35	4.20	<.001[a]	.22**	144.86	2.84	.005	0.07, 0.38
	Time2* MBSR	-.02	85.93	-1.80	.075	-.02	97.17	-0.76	.451	-0.06, 0.03
Gratitude	Time1	-.09	43.47	-2.74	.009	-.12*	93.68	-1.99	.049	-0.23, 0.00
	Time2	.02	52.17	2.14	.037	.01	55.91	0.71	.483	-0.02, 0.05
	Time1* MBSR	.23***	42.72	5.13	<.001[a]	.27***	105.12	3.42	.001[a]	0.11, 0.43
	Time2* MBSR	-.03*	51.34	-2.40	.020	-.02	72.38	-0.93	.354	-0.07, 0.02
Hope	Time1	.03	34.68	0.57	.571	-.02	120.41	-0.31	.754	-0.14, 0.10
	Time2	.00	33.05	-0.34	.740	-.01	70.53	-0.52	.606	-0.05, 0.03
	Time1* MBSR	.13	34.36	1.88	.069	.17*	150.87	2.07	.041	0.01, 0.33
	Time2* MBSR	.01	32.95	0.39	.699	.01	105.26	0.50	.620	-0.03, 0.06
Spirituality	Time1	-.04	32.01	-0.77	.447	-.08	124.34	-1.03	.304	-0.23, 0.07
	Time2	.01	32.23	0.57	.570	.00	84.61	0.11	.915	-0.04, 0.05
	Time1* MBSR	.26***	32.01	3.51	.001[a]	.32**	140.48	3.09	.002	0.12, 0.53
	Time2* MBSR	-.02	32.24	-1.14	.263	-.01	97.79	-0.47	.642	-0.08, 0.05

Note. TOT-M = Total score of mindfulness. Appreciation Beauty = Appreciation of beauty and excellence. MBSR=Mindfulness Based Stress Reduction. ITT=Intent-to-treat. 95% CI=95% confidence interval. *β* = Standardized linear regression coefficients. *df* = Degree of freedom. Negative coefficients indicate that participants in the intervention condition had a greater decrease over the specific time period compared to waitlist control participants. Positive coefficients indicate that participants in the intervention condition had greater gains over the specific time period compared to waitlist control participants.
* $p < .05$, ** $p < .01$, *** $p < .001$. [a] Results with the superscript indicate statistical significance using the Bonferroni correction ($p < .0019$) for multiple comparisons (27 tests, which also takes the models that were computed within the same project but not reported in the current manuscript into consideration).

Discussion

Based on these results, an updated and more detailed model of mutual support can be generated. The revised mutual support model is shown in Fig. 3. The strengths that were indeed increased after the mindfulness training were love, appreciation of beauty, gratitude, and spirituality, which should be in Path B of the model. The strengths of bravery and zest should still be considered for Path B of the model even though they have less statistical power ($p < .05$). The effects for curiosity and perspective are smaller ($\beta = .11$ and .10) and with even weaker statistical power ($p < .10$). These strengths were assumed to contribute to both Path A and Path B, because if they were strengths that motivate people to start mindfulness practice, they would have less room for improvement. Those strengths are included in parentheses in Fig. 3 to indicate that further verification is required. Although not tested directly in the present study, the remaining strengths were considered to overlap with mindfulness contribute to Path A of the model. These were: creativity, open-mindedness, love of learning, perseverance, social intelligence, forgiveness, self-regulation, and hope.

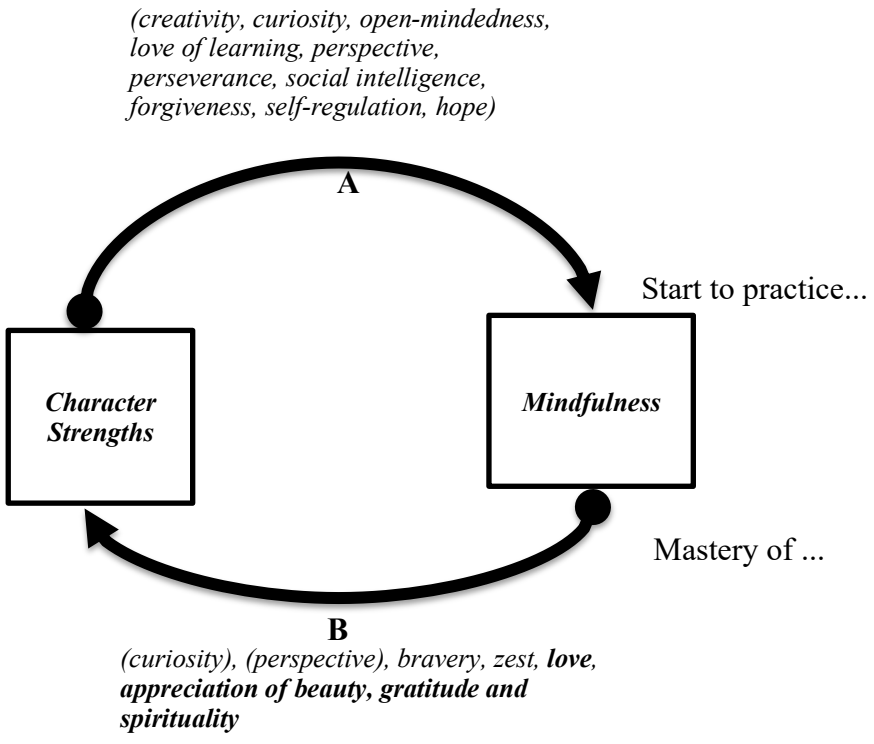


Figure 3. The revised mutual support model of mindfulness meditations and character strengths.

Path B: The strengths in **bold** indicate statistical significance after the Bonferroni corrections ($p < .0019$). The strengths not in bold indicate a less statistical power ($p < .05$), while strengths in parentheses indicate an even smaller statistical power ($p < .10$). Path A: The strengths presented in path A could not be tested directly in the present study.

General Discussion

This study presents preliminary evidence of relationships between mindfulness and character strengths within the VIA classification framework (Peterson and Seligman 2004). Meaningful relationships were observed between the two constructs, and the findings provide initial evidence for the mutual support model of mindfulness and character strengths. The results extend existing findings (Duan 2016; Duan and Ho 2018), as a more comprehensive measurement of character strengths was utilized to capture the full picture of the interconnections with mindfulness and its facets. In addition, the randomized-control design offers initial evidence that certain character strengths can indeed be fostered by a mindfulness training.

Based on these findings, links between mindfulness and character strengths can be established and a mutual support model that represents those links is proposed: certain character strengths facilitate the practice of mastering mindfulness, while the mastery of mindfulness enhances certain strengths. Both are seen as malleable in that they can be cultivated and developed with deliberate processes. It is clear from a conceptual standpoint and based on empirical findings that mindfulness seems to exert an influence on the development of certain character strengths, notably: curiosity, perspective, bravery, zest, love, appreciation of beauty, gratitude, and spirituality. Conversely, from a conceptual viewpoint, it also makes sense that certain character strengths have some sort of influence on mindfulness, such as facilitating its occurrence or enriching the practice. Those character strengths are creativity, curiosity, and perspective. Therefore, it can be boldly assumed that this mutual

support could work in a sort of cyclical fashion: through practice, mindfulness is enhanced, and this, in turn, increases the relevant character strengths. Some of these improved character strengths might presumably then feedback into improving the quality of mindfulness practice which then enhances mindfulness and so on in a continuous cycle. Through enabling increased awareness of ourselves, mindfulness allows us to develop our character strengths to a greater extent; in return, increased character strengths (such as self-regulation and curiosity) improve our ability to better pay attention and explore the present moment (Christopher and Colgan 2014).

The results of follow-up tests collected up to six months after the mindfulness training also suggest that the enhancement of specific character strengths does not decline over a longer period following training. The main reason for these lasting effects seems to be the regular home practice of the participants in Study 2, who completed homework on a regular basis during and after the eight-week course.

The most robust correlations between mindfulness and character strengths were identified as hope, bravery, curiosity, social intelligence, zest, love, perspective, and gratitude. These happen to include the strengths that correlated most with life satisfaction across different samples (i.e., hope, zest, gratitude, love, and curiosity; e.g., Brdar and Kashdan 2010; Buschor et al. 2013; Ruch et al. 2007; Ruch et al. 2010). This suggests that mindfulness and character strengths could be two different but connected pathways that lead to well-being. Is mindfulness training actually a direct training in character strengths that are related to life satisfaction, and thus a pathway to improve well-being? Future studies could investigate the specific role of those life-satisfaction related strengths in this process by testing their mediational role in the influence of mindfulness training on well-being.

Limitations and future research

Several limitations of the present study warrant mention and indicate that the results should be interpreted with caution. First, Study 1 relied exclusively on self-reported data

gathered online from participants via the Internet. Thus, a selection bias is to be expected because the participants are more likely to be people who are interested in positive psychology in general or are curious about self-discovery. This bias was minimized by advertising the study on a broad basis and by addressing the importance of the study to the targeted participants through invitation letters and e-mails. Second, although Study 2 was balanced with respect to demographics and outliers were checked before the analysis, the sample size was small. Therefore, some of the non-significant results for specific character strengths might be due to the small sample size; hence the possibility arises that these effects remain undetected. Other problems associated with small sample sizes may also apply, including low statistical power and capitalization on chance, so cross-validation using a larger sample remains desirable.

Third, in Study 2, the FFMQ was always completed before VIA-IS, which might have produced possible order effects in answering the instruments. For example, it is possible that answering mindfulness questions first can prime participants in a way that could activate their specific character strengths (e.g., appreciation of beauty). Fourth, Study 2 did not use an active control group. This leaves open the possibility that demand characteristics and/or placebo effects may have played a role in the results. Fifth, the strengths presented in Path A of the mutual support model were not examined because it could only be partially tested with our current sample. Only those character strengths that facilitate mindfulness training might be identified through the analysis (e.g., by using pre-tests of character strengths score to predict the improvement of mindfulness score). However, which character strengths potentially lead them to start practicing mindfulness training would still be not clear. An additional sample is needed, who are similar in age, gender and education, but have no interest in mindfulness training at all. Sixth, the mindfulness training was only an eight-week course. Although this sufficed to enable changes in specific character strengths, it is still a very short period compared to long-term practitioners of mindfulness. This should be taken

into consideration when interpreting the results, as it is possible that some character strengths need a longer duration to improve. Future research could employ longitudinal designs with follow-up tests of longer intervals and include participants who continue to practice over a longer period of time. Seventh, the particular training program of MBSR contains a variety of modules and exercises, making it impossible to determine the specific elements responsible for the observed changes in character strengths. The elements include, for example, breathing exercises, sitting together, and doing yoga, and any of these or a combination could be responsible for the observed changes. Future research could segment the elements of MBSR to clarify which lead to specific changes in character strengths.

Compliance with Ethical Standards

Funding: This study was funded by Swiss National Science Foundation (grant number 165465).

Conflict of Interest: The authors declare that they have no conflict of interest.

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the Ethics Committee of Department of Psychology at the University of Zurich and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent: Informed consent was obtained from all individual participants included in the study.

Author Contributions

DP: initiated, designed and executed the study, analyzed the data, and wrote the paper. WR: initiated and designed the study, assisted with the data analysis and collaborated in the writing.

Data Availability Statement: All data are available at the Open Science Framework (https://osf.io/dgf32/).

References

Baer, R. (2015). Ethics, values, virtues, and character strengths in mindfulness-based interventions: a psychological science perspective. *Mindfulness, 6*, 956-969. doi:10.1007/s12671-015-0419-2

Baer, R. A., & Lykins, E. L. M. (2011). Mindfulness and positive psychological functioning. In K. M. Sheldon, T. B. Kashdan, & M. F. Steger (Eds.), *Designing positive psychology: Taking stock and moving forward* (pp. 335-348). New York, NY: Oxford University Press.

Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment*, *13*, 27-45. doi:10.1177/1073191105283504

Baer, R. A., Smith, G. T., Lykins, E., Button, D., Krietemeyer, J., Sauer, S., ... & Williams, J. M. G. (2008). Construct validity of the five facet mindfulness questionnaire in meditating and nonmeditating samples. *Assessment, 15*, 329-342. doi:10.1177/1073191107313003

Barnard, J. & Rubin, D.B. (1999). Small sample degrees of freedom with multiple imputation. *Biometrika, 86,* 948-955. doi:10.1093/biomet/86.4.948

Bates, D., Mächler, M., Bolker, B., & Walker, S. (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software, 67(1)*, 1–48. doi:10.18637/jss.v067.i01

Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., Segal, Z. V., Abbey, S., Speca, M., Velting, D., & Devins, G. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice, 11*, 230–241. doi:10.1093/clipsy.bph077

Brdar, I., & Kashdan, T. B. (2010). Character strengths and well-being in Croatia: An empirical investigation of structure and correlates. *Journal of Research in Personality*, *44*, 151–154. doi:10.1016/j.jrp.2009.12.001

Bruna, M. O., Brabete, A. C., & Izquierdo, J. M. A. (2018). Reliability generalization as a seal of quality of substantive meta-analyses: The case of the VIA Inventory of Strengths (VIA-IS) and their relationships to life satisfaction. *Psychological Reports.* Advance online publication. doi:10.1177/0033294118779198

Buschor, C., Proyer, R. T., & Ruch, W. (2013). Self- and peer-rated character strengths: How do they relate to satisfaction with life and orientations to happiness? *The Journal of Positive Psychology, 8*, 116–127. doi.:10.1080/17439760.2012.758305

Campanella, F., Crescentini, C., Urgesi, C., & Fabbro, F. (2014). Mindfulness-oriented meditation improves self-related character scales in healthy individuals. *Comprehensive Psychiatry*, *55*, 1269–1278. doi:10.1016/j.comppsych.2014.03.009

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences (2nd ed.).* Hillsdale, NJ: Erlbaum.

Christopher, M., & Colgan, D. (2014). Getting into the flow of mindfulness practice [Review of the book *Mindfulness and Character Strengths: A Practical Guide to Flourishing* by R. M. Niemiec]. *Psyccritiques, 59*(1). doi:10.1037/a0036261

Cloninger, C. R., Svrakic, D. M., & Przybeck, T. R. (1993). A psychobiological model of temperament and character. *Archives of General Psychiatry, 50*, 975–990.

Crescentini, C., & Capurso, V. (2015). Mindfulness meditation and explicit and implicit indicators of personality and self-concept changes. *Frontiers in Psychology, 6*. doi:10.3389/fpsyg.2015.00044

Dahlsgaard, K., Peterson, C., & Seligman, M. E. P. (2005). Shared virtue: The convergence of valued human strengths across culture and history. *Review of General Psychology*, *9*, 203-213. doi:10.1037/1089-2680.9.3.203

Duan, W. (2016). Mediation role of individual strengths in dispositional mindfulness and mental health. *Personality and Individual Differences*, *99*, 7-10. doi:10.1016/j.paid.2016.04.078

Duan, W., & Ho, S. M. (2018). Does being mindful of your character strengths enhance psychological wellbeing? A longitudinal mediation analysis. *Journal of Happiness Studies*, *19*, 1045–1066. doi:10.1007/s10902-017-9864-z

Eberth, J., & Sedlmeier, P. (2012). The effects of mindfulness meditation: A meta-analysis. *Mindfulness*, *3*, 174-189. doi:10.1007/s12671-012-0101-x

Feuerstein, C. G. (2001). *The yoga tradition*. Prescott, AZ: Hohm Press.

Garfinkel, P. (2007). *Buddha or bust: In search of truth, meaning, happiness, and the man who found them all*. New York, NY: Three Rivers Press.

Grossman, P., Niemann, L., Schmidt, S., & Walach, H. (2004). Mindfulness-based stress reduction and health benefits: A meta-analysis. *Journal of Psychosomatic Research, 57,* 35-43. doi:10.1016/S0022-3999(03)00573-7

Giluk, T. L. (2009). Mindfulness, Big Five personality, and affect: A meta-analysis. *Personality and Individual Differences*, *47*, 805–811. doi:10.1016/j.paid.2009.06.026

Haimerl, C. J., and Valentine, E. R. (2001). The effect of contemplative practice on intrapersonal, interpersonal, and transpersonal dimensions of the self-concept. *Journal of Transpersonal Psychology 33*, 37–52.

Hanh, T. (1975). *The miracle of mindfulness: An introduction to the practice of meditation.* Boston MA: Beacon.

Ho, S. M., Li, W. L., Duan, W., Siu, B. P., Yau, S., Yeung, G., & Wong, K. (2016). A Brief Strengths Scale for individuals with mental health issues. *Psychological Assessment*, *28*, 147. doi:10.1037/pas0000164

Honaker, J., King, G., Blackwell, M. (2011). Amelia II: A program for missing data. *Journal of Statistical Software, 45*(7), 1–47. http://dx.doi.org/10.18637/jss.v045.i07

Ivtzan, I., & Lomas, T. (Eds.). (2016). *Mindfulness in positive psychology: The science of meditation and wellbeing*. New York, NY: Routledge.

Jahoda, M. (1958). *Current concepts of positive mental health*. New York, NY: Basic Books.

Kabat-Zinn, J. (1982). An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: Theoretical considerations and preliminary results. *General Hospital Psychiatry*, *4*, 33-47. doi:10.1016/0163-8343(82)90026-3

Kabat-Zinn, J. (1990). *Full catastrophe living*. New York, NY: Dell.

Kabat-Zinn, J. (1994). *Wherever you go, there you are: Mindfulness meditation in everyday life*. New York, NY: Hyperion.

Kristeller, J. L. (2003). Mindfulness, wisdom and eating: Applying a multi-domain model of meditation effects. *Journal of Constructivism in the Human Sciences*, *8*, 107-118.

Linehan, M. M. (1993). *Cognitive-behavioral treatment of borderline personality disorder*. New York, NY: Guilford.

McCrae, R. R. (2011). Personality traits and the potential of positive psychology. In K. M. Sheldon, T. Kashdan, T. B. Kashdan, & M. F. Steger (Eds.), *Designing positive psychology: Taking stock and moving forward*. New York, NY: Oxford University Press.

McCrae, R.R. & Costa, P.T. (1987). Validation of the five-factor model of personality across instruments and observers. *Journal of Personality and Social Psychology, 52*, 81-90.

McCrae, R. R. & John, O. P. (1992). An introduction to the five-factor model and its applications. *Journal of Personality, 60*, 175-215. doi:10.1111/j.1467-6494.1992.tb00970.x

Niemiec, R. M. (2013). VIA character strengths: Research and practice (The first 10 years). In H. H. Knoop & A. Delle Fave (Eds.), *Well-being and cultures: Perspectives on positive psychology* (pp. 11–30). New York, NY: Springer.

Niemiec, R. M. (2014). *Mindfulness and character strengths: A practical guide to flourishing*. Boston, MA: Hogrefe Publishing.

Macdonald, C., Bore, M., & Munro, D. (2008). Values in action scale and the Big 5: An empirical indication of structure. *Journal of Research in Personality*, *42*, 787–799. doi:10.1016/j.jrp.2007.10.003

Malinowski, P. (2013). Flourishing through meditation and mindfulness. In S. A. David, I. Boniwell, & A. Conley Ayers (Eds.), Oxford library of psychology. *The Oxford handbook of happiness* (pp. 384-396). New York, NY: Oxford University Press.

Michalak, J., Zarbock, G., Drews, M., Otto, D., Mertens, D., Ströhle, G., ... & Heidenreich, T. (2016). Erfassung von Achtsamkeit mit der deutschen Version des Five Facet Mindfulness Questionnaires (FFMQ-D) [Assessment of mindfulness with the German version of the Five Facet Mindfulness Questionnaires (FFMQ-D)]. *Zeitschrift für Gesundheitspsychologie, 24*, 1-12. doi:10.1026/0943-8149/a000149

Peterson, C., Park, N., & Seligman, M. E. P. (2005). Assessment of character strengths. In G. P.Koocher, J. C.Norcross, & S. S.Hill III (Eds.), *Psychologists' desk reference* (2nd ed., pp. 93–98). New York, NY: Oxford University Press.

Peterson, C. (2006). *A primer in positive psychology*. New York, NY: Oxford University Press.

Peterson, C., & Seligman, M. E. P. (2004). *Character strengths and virtues: A handbook and classification*. New York, NY: Oxford University Press.

Ruch, W., Huber, A., Beermann, U., & Proyer, R. T. (2007). *Character strengths as predictors of the "good life" in Austria, Germany and Switzerland*. In Romanian Academy, "George Barit" Institute of History, Department of Social Research (Ed.), Studies and researches in social sciences (Vol. 16) (pp. 123–131). Cluj-Napoca, Romania: Argonaut Press.

Ruch, W., Proyer, R. T., Harzer, C., Park, N., Peterson, C., & Seligman, M. E. P. (2010). Adaptation and validation of the German version of the Values in Action Inventory of

Strengths (VIA-IS) and the development of a peer-rating form. *Journal of Individual Differences*, *31*, 138-149. doi:10.1027/1614-0001/a000022

Sheldon, K. M., & King, L. (2001). Why Positive Psychology is necessary. *American psychologist, 56*, 216-217. doi:10.1037/0003-066X.56.3.216

Seligman, M. E. P. (2002). *Authentic happiness: Using the new positive psychology to realize your potential for lasting fulfillment*. New York, NY: Free Press.

Seligman, M. E., & Csikszentmihalyi, M. (2000). Positive psychology: An introduction. *American Psychologist, 55*, 5-14. doi:10.1037/0003-066X.55.1.5

Sin, N.L., & Lyubomirsky, S. (2009). Enhancing well-being and alleviating depressive symptoms with positive psychology interventions: A practice-friendly meta-analysis. *Journal of Clinical Psychology, 65*, 467-487. doi:10.1002/jclp.20593

Van Buuren, S., & Groothuis-Oudshoorn, K. (2011). Mice: Multivariate imputation by chained equations in R. *Journal of Statistical Software, 45*(3), 1-67. doi:10.18637/jss.v045.i03

van den Hurk, P. A. M., Wingens, T., Giommi, F., Barendregt, H. P., Speckens, A. E. M., and Van Schie, H. T. (2011). On the relationship between the practice of mindfulness meditation and personality: An exploratory analysis of the mediating role of mindfulness skills. *Mindfulness* 2, 194–200. doi:10.1007/s12671-011-0060-7

PART III

Fusing Character Strengths and Mindfulness Interventions: Benefits for Job Satisfaction and Performance

Dandan Pang and Willibald Ruch

Pang, D. & Ruch, W. (2019). Fusing Character Strengths and Mindfulness Interventions: Benefits for Job Satisfaction and Performance. *Journal of Occupational Health Psychology, 24*, 150-162. doi:10.1037/ocp0000144

Open Access available at

https://psycnet.apa.org/fulltext/2019-05630-003.html

Abstract

In recent years both mindfulness and character strengths have started to garner interest in industrial and organizational psychology (IO). The growing research interest in their effects of those two on employee well-being and performance, individually, has strong practical implications for organizations. Given the interconnection of mindfulness and character strengths, the present study examined the effectiveness of training, which combined the two practices regarding well-being and work-related outcomes; and it tested the potential mediators of the effects at work. A total of 63 participants from various job branches were randomly assigned to three conditions: (1) Mindfulness-Based Strengths Practice (MBSP); (2) Mindfulness-Based Stress Reduction (MBSR); and (3) Wait-list Control. Participants' applicability of character strengths at work, well-being, perceived stress, job satisfaction, and task performance (supervisor rating) were assessed before and after the intervention, and 1-, 3-, and 6 months afterwards. A set of linear mixed-effects models was applied, modelling changes in participants' outcome variables over time. Potential mediators for the intervention effect of MBSP at work were tested using four criteria adapted from a previous study. Results showed the MBSR was effective for increasing well-being, reducing perceived stress, and increasing job satisfaction, whereas the MBSP was effective for increasing well-being, job satisfaction and task performance. These findings suggest that mindfulness alone seems to function better when regarding well-being at work, while fusing character strengths on top of it seems to influence the participants, on a motivational level, and thus bolsters task performance.

Keywords: character strengths, job satisfaction, mindfulness-based intervention, task performance, workplace

Introduction

Mindfulness ("to pay attention in a particular way – on purpose, to the present moment, nonjudgmentally", Kabat-Zinn, 1994, p. 4) has developed into a booming area of scientific research in less than 30 years. Particularly in the last decade, there has been a spate of interest in implementing mindfulness to promote employee health and well-being at work (e.g., Klatt, Buckworth, & Malarkey, 2009; Wolever et al., 2012). The organizational interest in mindfulness has been focused on the effectiveness of mindfulness training programs for employees and leaders. Findings suggest beneficial effects for stress reduction (Aikens et al., 2014; Baccarani, Mascherpa, & Minozzo, 2013), increase in job satisfaction (Hülsheger, Alberts, Feinholdt, & Lang, 2013) and performance at work (Shao & Skalicki, 2009); and enhancing of resilience and social relationships in the workplace (Glomb, Duffy, Bono, & Yang, 2011). Leader's mindfulness is positively associated with different facets of employee well-being (e.g., job satisfaction and need satisfaction), as well as employee performance (Reb, Narayanan, & Chaturvedi, 2014). Despite the initial evidence for the positive relationship between mindfulness and employee health and well-being, the critique of existing research on workplace mindfulness interventions has been raised (Jamieson & Tuckey, 2017). There are methodological limitations within the workplace mindfulness literature that need to be resolved in order to maximize the study validity in this area. For instance, of the 40 studies Jamieson and Tuckey (2017) reviewed, only half of them (50%) were randomized controlled trials (RCTs), around one fourth (27.5%) of them did not even utilize a control group, and only one study used a comparison condition. There is also a large gap in the literature regarding practice maintenance (i.e., if participants continue engaging in mindfulness practice even after the intervention period) and whether it influences the effect of mindfulness for a longer period of time (Jamieson & Tuckey, 2017). Moreover, the potential mechanisms have been discussed from a theoretical framework (see a review, Good et al., 2016), yet possible

mediators or moderators have not been explored empirically to understand how mindfulness has beneficial effects in the workplace.

Character strengths, a family of positive personality traits that are morally valued and associated with the good life (Peterson & Seligman, 2004; Park, Peterson, & Seligman, 2004; Ruch, Huber, Beermann, & Proyer, 2007), have also emerged as another important ingredient for employee health and well-being. Several character strengths were associated with work satisfaction across a range of occupation types (e.g., hope, and zest; Gander, Proyer, Ruch, & Wyss, 2012; Park et al., 2004; Peterson, Stephens, Park, Lee, & Seligman, 2010), as well as job performance (Harzer & Ruch, 2014), increasing productivity and decreasing turnover rates (Hodges & Asplund, 2010). Individuals who scored higher in zest would be more likely to experience their work as a "calling" (work for the fulfilment instead of financial gain or career advancement), and would report increased work satisfaction, greater reluctance to retire, and fewer sick days (Peterson et al., 2010; Wrzesniewski et al., 1997). Peterson and Seligman (2004) argue that each person possesses three to seven (out of the 24) character strengths, which characterize the person best and thus constituting so-called signature strengths (i.e., "[…] strengths that a person owns, celebrates, and frequently exercises"; Peterson & Seligman, 2004, p. 18). They argue that people experience a feeling of excitement while displaying their signature strength and that the use of the signature strength is invigorating rather than exhausting. Harzer and Ruch (2012, 2013, 2016) showed that when more signature strengths were applied at work, higher levels of positive experiences and employees considering their work as a calling were found (four or more is better). The association increased with the centrality of the strengths (i.e., the personal ranking of the strengths) for the individual (Harzer & Ruch, 2012, 2013, 2016). These findings indicate that specific character strengths and the application of them at the workplace (especially when they fit with a person's work-environment) could play an important role for work-related outcomes like workplace well-being and job performance.

Bringing character strengths into mindfulness training

Although both mindfulness and character strengths foster employee well-being and performance individually, only a few studies started to investigate their potential overlap and synergetic effect. There are mainly two approaches. First, Pang and Ruch (2018) put forward a mutual support model of mindfulness training and character strengths. They suggest that people with higher levels of certain character strengths (e.g., love of learning & appreciation of beauty) would pick up and engage in a mindfulness training more easily, while certain character strengths (e.g., curiosity & self-regulation) are enhanced by mindfulness training. Second, pioneer practitioners such as Niemiec (2013) started to combine and integrate the two into a training named Mindfulness-Based Strengths Practice (MBSP). While no published study investigated the effectiveness of the MBSP in a randomized controlled design, preliminary data showed that it has the potential to increase well-being. For example, Niemiec (2013) reported in his book that the participants' general well-being increased after the training. Ivtzan, Niemiec, and Briscoe (2016) also suggest that participants' well-being was significantly increased (despite a very small sample) after taking part in the eight-week MBSP with Niemiec (2013) online; yet, there is no comparison to a control group. There are also case discussions on the first usage of the MBSP in a work setting, which suggest that the MBSP might help people in the workplace manage stressful situations better and recognize, appreciate and prioritize the character strengths of their colleagues (Niemiec & Lissing, 2016). These findings suggest that the combination of the two mutually supported concepts – mindfulness and character strengths – function not only separately as a pathway to positive experiences at the workplace but also have a joint effect. However, this has never been tested empirically, yet. Neither pretest and posttest designs, nor comparison groups or a randomization design have been implemented so far. Therefore, additional research such as RCTs that include a (wait-list) control and a comparison condition, alongside measures capturing within-group changes over time and between-group differences by means of pre-,

and postintervention measurements, are needed in order to enhance the internal validity of the MBSP studies. Regarding internal validity, random allocation plays an important role because it eliminates possible sources of bias and reduces the risk of disparity between groups on unknown but important factors that could influence the outcomes of the study. On the other hand, there is recent evidence suggesting that mindfulness might not be "*a cure for essentially every ailment*" (e.g., Hafenbrack & Vohs, 2018). Although not impacting performance, mindfulness might impair task motivation, which could conflict with the general objectives of the organization to put forward mindfulness intervention at work (Hafenbrack & Vohs, 2018). However, adding character strengths on top of the mindfulness intervention might solve this problem by positively influencing the participants' motivation as well.

Furthermore, as one of the key features of the MBSP is encouraging the participants to apply their character strengths in different ways with the help of mindfulness, one might assume that the application of the strengths could potentially contribute to the effect of the MBSP. As mentioned before, the applicability of the character strengths at the workplace is associated with workplace well-being and job performance, thus it could serve as a mediator for the effect of the MBSP on the work-related outcomes. There are a few character strengths that have been found to be associated with work satisfaction across different studies. For instance, curiosity, zest, hope, gratitude, and spirituality are the *Big 5 strengths* predicting work satisfaction across several job types (Peterson et al., 2010). Furthermore, character strengths – especially curiosity, wisdom, bravery, perseverance, zest, love, social intelligence, and hope – correlate significantly with work satisfaction ($r \geq .30$, Gander et al., 2012). Therefore, we assume that, given there is an effect of the MBSP on job satisfaction, the applicability of these strengths (we labelled them as the work-satisfaction-related character strengths in the following sections) at the workplace could be the mediator of the effect. By the same token, Harzer and Ruch (2014) reported that the number of signature strengths used at work was related to all dimensions of job performance and employees who used four or

more of their signature strengths had more positive work experiences and were more likely to consider their work as a calling than those who expressed less than four (Harzer & Ruch, 2012). Therefore, it is evident to assume that if there is an intervention effect of the MBSP on job performance, it could be mediated by the applicability of participants' signature strengths (top strengths) at the workplace.

The present study

Using a randomized, wait-list controlled design, the present study aims at testing the effectiveness of two mindfulness interventions on psychological well-being and work-related outcomes, namely (1) the newly developed MBSP, and (2) the well-established MBSR. Additionally, the present study also aims at testing whether those intervention effects maintain over a longer period of time (i.e., up to six months after the intervention period). Given that the intervention effects of work-related outcomes could be corroborated, the present study additionally aims at testing the possible mediators of the intervention effects at the workplace.

The study's hypotheses were threefold: (1) The participants in the MBSP condition would report a reduced level of perceived stress, an increased level of well-being, job satisfaction and task performance regarding the difference between the baseline and the post-intervention, as compared to participants of the wait-list control condition; (2) The participants in the MBSR condition would report a reduced level of perceived stress, an increased level of well-being, job satisfaction and task performance regarding the difference between the baseline and the post- intervention, as compared to participants of the wait-list control condition; (3) The effects of MBSP on work-related outcomes would be mediated by the applicability of character strengths. For the follow-up measurements, we did not postulate specific hypotheses but rather decided to examine the stability of the effects exploratively.

Material and methods

Participants

Eligible participants were adults 18 years of age or older, meeting the following inclusion criteria: (a) no previous meditation experience; (b) level of employment ≥50%[1]; and (c) neither attending psychotherapeutic treatment nor using psychotropic/illegal drugs throughout the duration of the study. A priori power analyses were conducted using the G*Power software (Faul, Erdfelder, Lang, & Buchner, 2007), indicating that at least 63 participants would be needed to detect a small towards medium effect in a repeated-measures design testing a within-between interaction while assuming an α error probability = .05 and power = 95% with an expected correlation of .50 among repeated measures. Eighty-Six Participants registered for the study online between June 2016 and September 2016 and completed a screening and baseline assessment. The final sample consisted of 63 participants (68.9% female) with an age ranging from 22 to 61 years (M = 44.2, SD = 10.0). They were randomly assigned to one of the three conditions: (1) Mindfulness-Based Strengths Practice (MBSP, Niemiec, 2013; n = 21); (2) Mindfulness-Based Stress Reduction (MBSR, Kabat-Zinn, 1982; n = 21); and (3) Wait-list Control (WL; n = 21). Information on participant flow is provided in Figure 1. As shown in Figure 1, of the 63 participants who filled out the baseline measure, 52 completed the post-test and the first follow-up test and 50 completed the second and third follow-up test. We retained more than 76% of the participants at the six-month follow-up tests for both self- (n = 50) and supervisor- (n = 48) ratings.

[1] This is related to the Swiss work culture. People in full-time posts (namely, 100% level of employment) work an average of 42 hours a week. Yet, an increasing number of people choose to work less, often for family reasons. A 50% position could mean two days of work one week, followed by three the next. In the present study, we set 50% as our inclusion criterion because we are interested in the workplace outcomes. A lower percentage of employment might have led to unnecessary cofounding.

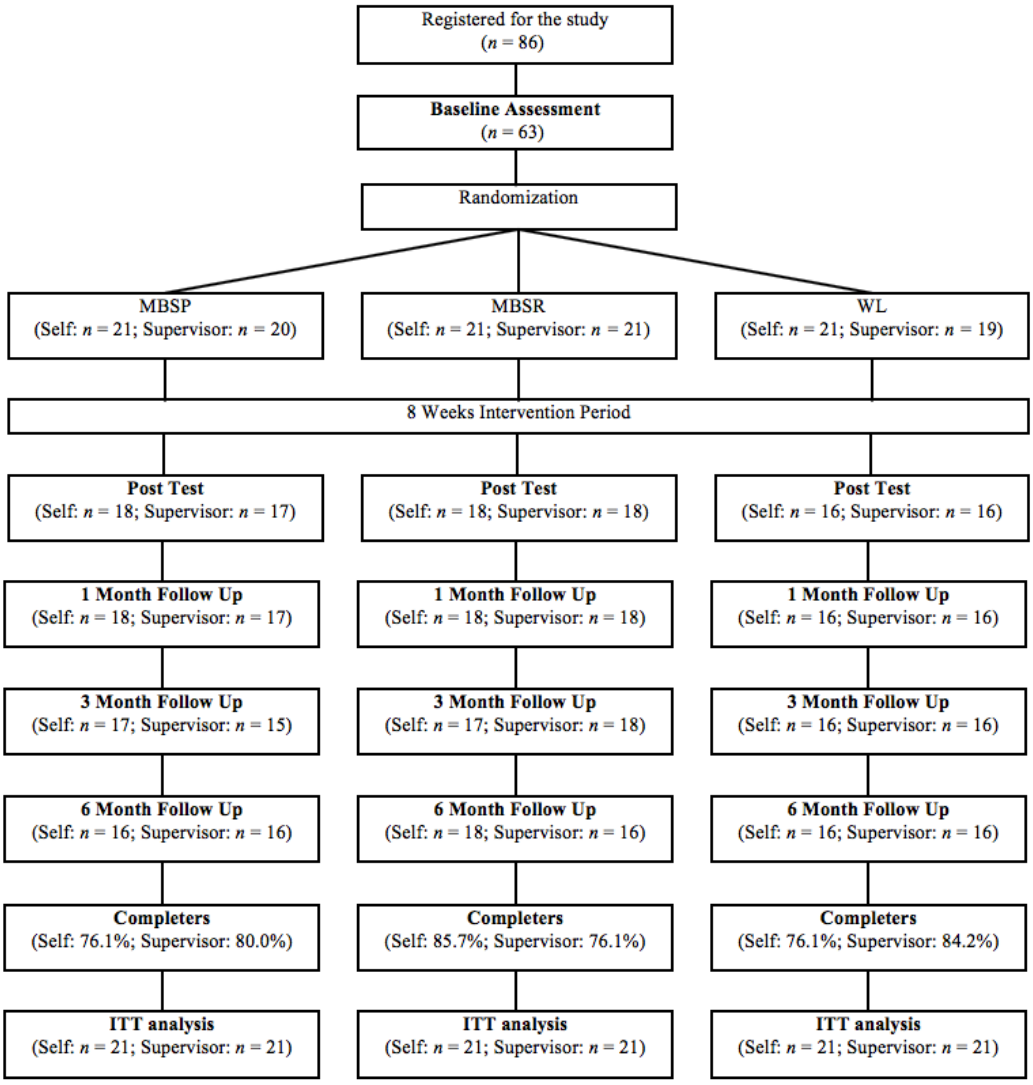


Figure 1. Participants flow through the study.

MBSP = Mindfulness Based Strengths Practice; MBSR = Mindfulness Based Stress Reduction; WL = Wait-list Control. ITT = Intent-to-treat.

More More than half of the participants (61.9%) had a degree from university or university of applied sciences or were studying at the time they filled in the questionnaire. The participants were all employed (average level of employment was 88.43%) and covered a variety of job branches, including sales/administration (19.1%), medical/social help (19.0%), education and research (15.9%), HR (6.3%), finance/banking (4.8%), marketing/media

(3.2%), management (3.2%), service (1.6%) with around one fifth of the participants reporting multiple branches (22.2%).

Procedure

The procedure was approved by the Ethics Committee of the Department of Psychology at the University of Zurich. To reach a larger audience of people at the workplace, the study was promoted by posting leaflets (with the instruction to participate in the study) through the internet (e.g., online forum, social media, and different kinds of mailing lists). In addition, the contact details of the human resource professionals (HR), in and around Zurich, were sought out on the internet. An invitation e-mail along with the leaflet was sent to the HR. They were asked to forward the e-mail to their colleagues who would potentially be interested in the study. Volunteers then signed up for participation through a web link (via Unipark platform) provided on the leaflet. All participants were asked to pay 100 CHF to attend the interventions (to motivate participants and reduce the dropout rate) and they were given individual feedback as the incentive.

After registration, participants were randomly[2] assigned to one of the three conditions. For both of the intervention groups, a confirmation e-mail was sent to each participant with the information on the trainer and when and where the mindfulness training would take place along with the informed consent. Before the intervention started, participants were asked to complete the baseline questionnaires online using their personal devices. One supervisor of the participant was contacted to rate the participant's task performance. The supervisor's

[2] Upon registration, participants were asked to indicate their availability on the website because we only provided the mindfulness training on Monday or Tuesday evening after work. They were all informed that they would participate in a mindfulness-based training without knowing the details (and that there were different trainings on the two days). Altogether 38 participants could only attend on one of the two days; 25 participants (39.7%) indicated that they could come on both days and they were randomly assigned (i.e., 28.6% to MBSR, 47.6% to MBSP, and 42.9% to the control group). Thus, while randomization was limited, we assume that this did not bias the results because the participants did not know which conditions they were assigned to.

rating was given anonymously, and both the participant and the supervisor were informed about this beforehand[3].

The content of the interventions. Participants in the two intervention conditions gathered once a week in a classroom at the University of Zurich for eight consecutive weeks and received the training in a group setting led by qualified trainers with each session lasting approximately 2 hours. The MBSP group received a training built on Nhat Hanh's and Kabat-Zinn's work on mindfulness (Kabat-Zinn, 1990; Nhat Hanh, 1975, 1991) as well as Peterson and Seligman's character strengths research (Peterson & Seligman, 2004). It typically started with an opening meditation; followed by a dyad or group discussion on reviewing the previous session and homework; then followed by a theoretical input introducing new materials; continued with an exercise of mindfulness or character strengths (or its combination) and subsequent debriefing; eventually concluding by a closing meditation with strength Gatha. The MBSR group received a two-hour version of the standard MBSR curriculum (without the retreat that is proposed in the manual). Homework (every day 20-40 minutes) was suggested to all participants in both intervention conditions between each session, which required them to repeat certain mindfulness/strengths practices by providing reflective journals and audio tapes. Within the Wait-list Control group, participants were advertised the same way as the other two conditions to participate in a mindfulness-based intervention. However, they were later informed that the current interventions were all booked out and they could only attend the intervention next year. The specifics of the wait-control design were explained, and they were asked to fill out the instruments and pay the fee. After the data collection was completed, the Wait-List Control group also received the MBSP intervention from May-04 to June-21, 2017.

[3] A separate e-mail was sent to each participant with a link and instruction for the supervisor rating for them to forward to their supervisor. Participants were informed (with bold font) that the link would expire after 1 click, in order to make sure that they themselves do not click the link, which grantees the anonymity of the rating (participants would have no access to what the supervisor rated).

Data collection was administered online via the Unipark survey platform. All participants were asked to complete the same self-rating questionnaires and forward the 5-item supervisor rating to their supervisors at the identical time point: one week, one month, three months, and six months after the interventions. Additionally, participants reported how often they completed the suggested homework on average as a measure of practice maintenance, both throughout the intervention as well as after the intervention on a 6-point scale (0 = *never*, 1 = *less than one day per week, on the average* , 2 = *one day per week, on the average* , 3 = *two or three days per week, on the average* , 4 = *four or five days per week, on the average*, 5 = *more than five days per week*). At the post-test, participants were also asked to rate their trainer on how motivated, friendly, competent, organized, and supportive he/she has been perceived. E-mail reminders to fill out the questionnaires were sent to participants at the relevant time points. Data collection lasted through April 2017; the study concluded when participants completed their 6-months follow-up assessment.

Measurements[4]

Applicability of Character Strengths Rating Scales (ACS-RS; Harzer & Ruch, 2013). The ACS-RS assesses the extent to which each of the 24 character strengths is applicable at the workplace under four influences: (1) normative demands of a situation (actual wording: "it is demanded"); (2) appropriateness of the behaviour ("it is helpful"); (3) perceived presence of factors that may facilitate or impede the behaviour ("I do it"); and (4) intrinsic motivation to show it ("it is important for me"). For each of the character strengths, short paragraphs are provided describing relevant behaviour based on the definitions by Peterson and Seligman (2004). The scale consists of 96 items with a 5-point scale (from 1 = *never* to 5 = *[almost] always*) and showed satisfactory internal consistency (from .77 to .93) and inter-rater agreement (Harzer & Ruch, 2012, 2013).

[4] This is part of a larger data collection, there were other instruments used in the same project. However, they were not relevant to the current research question and the data reported here have not yet been published elsewhere.

WHO-Five Well-being Index (WHO5; WHO, 1998). The WHO5 measures the subjective quality of life based on positive mood (good spirits, relaxation), vitality (being active and waking up fresh and rested), and general interest (being interested in things) during the past two weeks. The scale contains 5 positively phrased items with a 6-point Likert scale (from 0 = *none of the time* to 5 = *all of the time*).

Perceived Stress Scale-10 (PSS-10; Cohen & Williamson, 1988). The PSS measures a person's self-perceived stress level during the last month. The scale consists of 10 items with a 5-point Likert scale (from 1 = *never* to 5 = *very often*) and showed adequate internal consistency (α = .78; Cohen & Williamson, 1988). The 10-item German version of the scale (Büssing, 2011) was used in the current study.

Job Satisfaction Questionnaire (JSQ; Andrews & Withey, 1976). The JSQ measures job satisfaction consisting of five items utilizing a 7-point Likert-scale (from 1 = *terrible* to 7 = *delighted*). The JSQ showed high reliability (α = .81) and convergent validity (Rentsch & Steel, 1992). The German version of the scale was used in the current study, which also demonstrated high reliability (α = .80; Harzer & Ruch, 2013).

Task Performance Questionnaire (TPQ; Williams & Anderson, 1991). The TPQ is a questionnaire for supervisory ratings on task performance, which measures in-role behaviour independently from occupational groups. It consists of seven items with a 7-point Likert-scale (from 1 = *strongly disagree* to 7 = *strongly disagree*). Satisfying internal consistency was reported by different studies (α = .80-.96; Diefendorff, Brown, Kamin, & Lord, 2002; Williams & Anderson, 1991). The German version of the scale used in the current study showed satisfactory reliability (α = .82; Harzer & Ruch, 2014).

Data Analysis

Statistical model. A set of linear mixed-effects models was applied, modelling changes in participants' outcome variables over time. The R package "lme4" (Bates, Mächler, Bolker, Walker, 2015) was used to conduct the analyses, which was based on the restricted

maximum likelihood estimation (REML). We postulated a series of piecewise growth models, where we split the time variable into two different phases: (1) From baseline until right after the intervention (i.e., Month 0–2; acute intervention phase); and (2) From right after the intervention until the six-month follow-up tests (i.e., Month 2–8; follow-up phase). We dummy coded the time variable into two variables: Time1 (0, 2, 2, 2, 2) and Time2 (0, 0, 3, 5, 8) to represent the different time periods.

The statistical model for each outcome variable can be summarized as follows:

$$Y_{ij} = [\gamma_{00}+\gamma_{01}Condition_j+\gamma_{10}Time1_{ij}+\gamma_{11}Condition_j * Time1_{ij}+\gamma_{20}Time2_{ij}+ \gamma_{21}Condition_j * Time2_{ij}] + [U_{1j} * Time1_{ij}+U_{2j} * Time2_{ij} + U_{0j} + R_{ij}]$$

where, $R_{ij} \sim N(0, {\sigma_R}^2)$ and $\begin{Bmatrix} U_{0j} \\ U_{1j} \\ U_{2j} \end{Bmatrix} \sim N \begin{Bmatrix} 0 & \tau_{00} & \tau_{01} & \tau_{02} \\ 0, & \tau_{10} & \tau_{11} & \tau_{12} \\ 0 & \tau_{20} & \tau_{21} & \tau_{22} \end{Bmatrix}$

Y_{ij} refers to the scores of the perceived stress, the well-being, the job satisfaction and the task performance at all measurement points (i.e., one week, one month, two months, and six months after the intervention). Two levels of models were embedded in this linear mixed-effects model. The Level 1 model captures the within-person change in the outcome variables over all five time points. This within-person change in the outcome variables is referred to as slope (two slopes for Time1 and Time2, respectively). The Level 2 model reflects participants' condition (MBSP, MBSR, WL) as the between persons' predictor (the WL served as a reference group). For all models, the continuous measures in the Level 1 model were centered at the pre-test (i.e., the intercept). The intervention effect was evaluated by examining the Time1*Condition interaction (γ_{11}) and Time2*Condition interaction (γ_{21}), which reflects group differences in improvement from pre-test to post-test and stayed unchanged from post-test to follow-up tests. It is represented by the β coefficient associated with the intervention conditions in the Level 2 model.

Subsequently, we also tested the potential mediators for the MBSP's intervention effect on the work-related variables over Time1, respectively. The visual representation of the

hypothesized mediators of the intervention effect is presented in Figure 3. Four criteria were used to provide the estimation of the mediation effect, which was adapted from the procedure of a previous study (Stice, Presnell, Gau, & Shaw, 2007). They are displayed in Table 1.

Table 1. *Four Criteria for the Estimation of the Mediation Effect*

Criteria	Estimated by	Description
Criterion 1: The effect of the intervention condition on the outcome variables over Time1 (Figure 3, path c)	$Y_{ij} = [\gamma_{00}+\gamma_{01}Condition_j+ \gamma_{10}Time1_{ij}+\gamma_{11}Condition_j * Time1_{ij}] + [U_{1j} * Time1_{ij} + U_{0j} + R_{ij}]$	Y_{ij} is the value of the outcome variables for person j at time i. The effect of condition on rate of change of the outcome variables is γ_{11} (path c).
Criterion 2: The effect of the intervention condition on the mediator over Time1 (Figure 3, path a)	$Mediator_{ij} = [\gamma_{00}+ \gamma_{01}Condition_j+\gamma_{10}Time1_{ij}+ \gamma_{11}Condition_j * Time1_{ij}] + [U_{1j} * Time1_{ij} + U_{0j} + R_{ij}]$	$Mediator_{ij}$ is the value of the mediator for person j at time i. The effect of condition on rate of change of the mediator is γ_{11} (path a).
Criterion 3: A relation in the intervention condition between change in the mediator and change in the outcome over Time1 (Figure 3, path b)	$Y_{ij} = [\gamma_{00}+\gamma_{01}\Delta Mediator_j] + [R_{ij}]$	Y_{ij} is the value of the outcome variables for person j at time i. $\Delta Mediator_j$ is modelled as level-2 variable. The effect of change in the mediator on the change in the outcome is γ_{01} (path b).
Criterion 4: The effect of the intervention condition on the outcome variables over Time1 controlling for the change in the mediator (Figure 3, path c')	$Y_{ij} = [\gamma_{00}++\gamma_{10}Time1_{ij} + \gamma_{01}Condition_j+\gamma_{11}Condition_j * Time1_{ij}+\gamma_{02}\Delta Mediator_j] + [U_{1j} * Time1_{ij}+U_{0j} + R_{ij}]$	Y_{ij} is the value of the outcome variables for person j at time i, controlling for the change in the mediator. The effect of condition on rate of change of the outcome variables controlling for the change in the mediator is γ_{11} (path c'). The standard error formula from Freedman & Schatzkin (1992) was used to generate a t-test for determining whether c-c' was significantly different from zero.

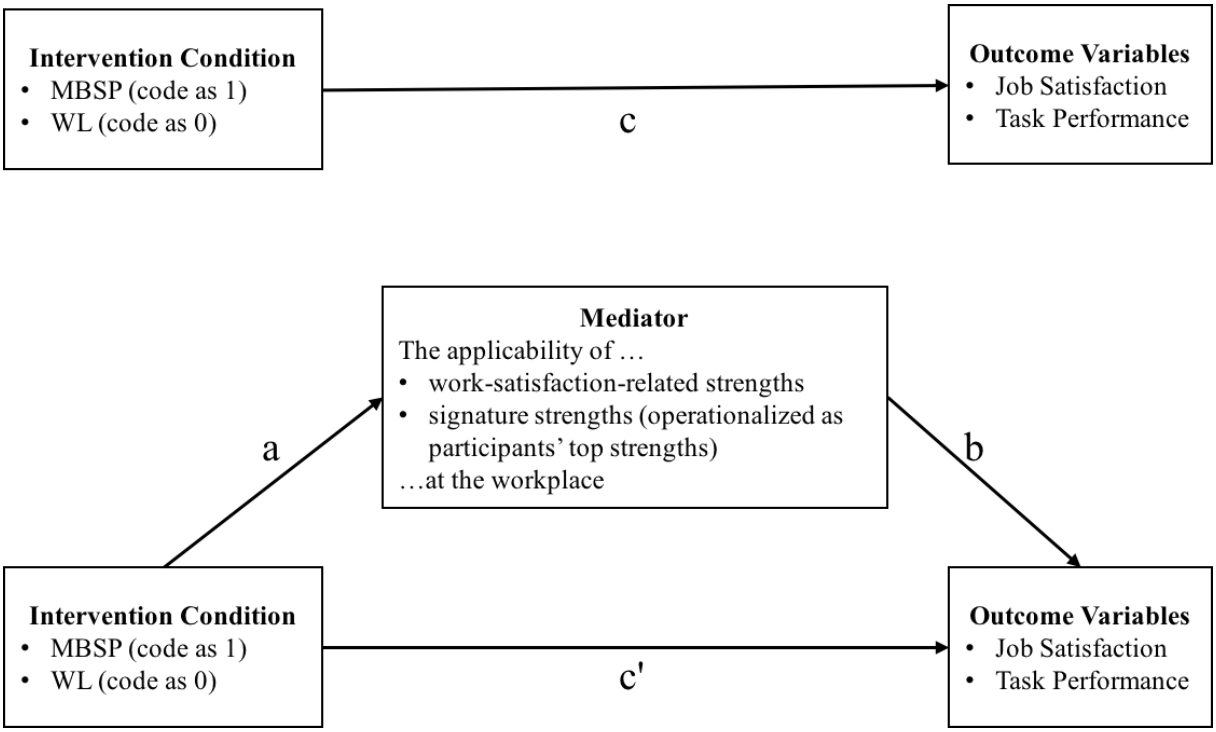


Figure 3. The graphical representation of the hypothesized meditators of the interventions.

MBSP = Mindfulness Based Strengths Practice; MBSR = Mindfulness Based Stress Reduction; WL = Wait-list Control.

Intent-to-treat analysis. To provide additional information about the generalizability of the findings, in addition to the linear mixed-effects models that were conducted with completers' dataset, a set of intent-to-treat (ITT) analyses was also conducted. Thus, we could test whether the same pattern of results would have emerged if dropouts (those who filled out the baseline measure but did complete the later on measures) had completed the study. Missing values were handled by multiple imputation (MI) to provide the reliable estimations. In this procedure, missing data were imputed for each condition at each time point using the algorithm EM (R package "Amelia", Honaker, King, & Blackwell, 2011). It repeated this process 50 times to produce the 50 complete datasets where the observed values were the same and the unobserved values were drawn from their posterior distributions. The effectiveness analyses were then performed on each of the 50 resulting data files, and the 50

estimates were combined into a single overall estimate using the MI inference rules of "smallsample" (Barnard & Rubin, 1999), which adjusted degrees of freedom for small samples. This yielded proper *p* values and confidence intervals for the estimates (R package "mice", Van Buuren & Groothuis-Oudshoorn, 2011). This approach was shown to be superior to the other imputation methods (e.g., last observation carried forward) because it requires only a few assumptions to be made about the nature of missing data (Schafer & Graham, 2002).

Results

Preliminary analysis and intervention adherence

We tested the differences in demographics, work-related properties and the outcome variables among the three conditions at baseline, using one-way analyses of variances (for continuous variables) and chi-square tests (for categorical variables). No significant differences were detected across the three conditions in terms of age, gender, education, nationality, family status, religion, job type, working percentage, salary, wellbeing, perceived stress, job satisfaction, and task performance, suggesting the randomization created initially equivalent groups. Participants' rating on the trainers (how motivated, friendly, competent, organized, and supportive the trainers were) also did not differ. In addition, a correlation matrix (including their mean and standard deviation) among all outcome variables i.e., ACS-RS, PSS-10, WHO5, JSQ and TPQ at pre-test, can be found in the online Supplementary Materials of the study (Table S1) to better understand the relationship among the variables being studied.

To determine whether the completers and the dropouts differed from each other, a series of *t*-tests (for continuous variables) and chi-square tests (for categorical variables) was conducted. No differences were found based on completion status for baseline levels of all variables (i.e., the demographics, the work-related properties, and all the outcome variables).

Dropout rates did not differ across conditions with $\chi^2(2) = 0.184$, $p = .912$, indicating that the intervention type was not related to attrition.

Table 2. *Completion of Homework within the two Intervention Conditions*

	During the intervention				After intervention till 1 month later				1 months till 3 months after intervention				3 months till 6 months after intervention			
	MBSP		MBSR		MBSP		MBSR		MBSP		MBSR		MBSP		MBSR	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Never	0	0.0	0	0.0	3	14.3	1	4.8	3	14.3	3	14.3	1	4.8	2	9.5
< once a week	0	0.0	0	0.0	2	9.5	4	19.0	4	19.0	5	23.8	5	23.8	6	28.6
once a week	5	23.8	2	9.5	4	19.0	3	14.3	1	4.8	2	9.5	5	23.8	3	14.3
2-3 times a week	5	23.8	5	23.8	6	28.6	7	33.3	6	28.6	6	28.6	3	14.3	6	28.6
4-5 times a week	6	28.6	8	38.1	2	9.5	3	14.3	4	19.0	0	0.0	1	4.8	1	4.8
> 5 times a week	2	9.5	3	14.3	1	4.8	0	0.0	0	0.0	1	4.8	1	4.8	0	0.0

Note. MBSP = Mindfulness Based Strengths Practice; MBSR = Mindfulness Based Stress Reduction; WL = Wait-list Control.

As shown in Table 2, participants in both the MBSP and the MBSR condition reported continued engagement in homework (practice) throughout the training and after the training ended. All participants reported practicing homework on average once a week or more during the training. Even when the training was over, still a considerable number of participants (42.9% of MBSP and 47.7% of MBSR) reported continuing practicing the suggested homework once a week or more until six months later. How much homework participants completed during and after the interventions did not differ across the two intervention conditions (χ^2 ranged from 1.77 to 5.42, $p > .05$).

Intervention effectiveness

The intervention effectiveness was evaluated by examining the significant difference between the rates of change (slope) in the score of outcome variables for the intervention condition (MBSP and MBSR) in comparison to the Wait-list Control condition (WL). The descriptive data (means and standard deviations) can be found in Table 3 (using the completers' data), whereas the piecewise linear mixed-effects models are given in Table 4 (using both completers' and ITT data).

Table 3. *Descriptive Data of the three Conditions at the Five Time Periods for the Outcome Variables*

	Pre			Post			1 M			3 M			6 M		
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
Perceived Stress															
MBSP	21	2.04	0.61	18	1.96	0.62	18	1.78	0.74	17	1.80	0.71	16	1.78	0.89
MBSR	21	2.00	0.74	18	1.43	0.45	18	1.56	0.51	17	1.47	0.67	18	1.47	0.40
WL	21	2.13	0.68	16	2.31	0.78	16	2.12	0.78	16	2.06	0.71	16	2.09	0.75
Well-being															
MBSP	21	13.05	5.08	18	14.67	6.23	18	14.28	5.77	17	15.88	6.09	16	15.50	5.80
MBSR	21	13.05	4.97	18	16.00	3.83	18	15.06	4.14	17	16.53	6.15	18	16.89	2.32
WL	21	13.05	6.03	16	11.25	4.99	16	12.75	5.07	16	12.75	6.29	16	13.00	4.99
Job Satisfaction															
MBSP	21	4.20	0.83	18	4.38	0.95	18	4.40	0.85	17	4.34	0.97	16	4.34	0.84
MBSR	21	3.88	1.09	18	4.26	1.00	18	4.26	1.01	17	4.14	1.11	18	4.13	1.03
WL	21	4.24	0.99	16	3.98	0.68	16	4.14	0.70	16	3.95	0.79	16	3.86	0.79
Task Performance															
MBSP	20	5.77	0.66	17	6.18	0.47	17	6.05	0.69	15	5.77	0.91	16	5.99	0.62
MBSR	21	5.92	0.81	18	5.90	0.90	18	5.76	0.81	18	6.01	0.68	16	6.09	0.68
WL	19	5.91	0.71	16	5.93	0.63	16	5.91	0.54	16	6.11	0.37	16	6.15	0.44

Note. MBSP = Mindfulness Based Strengths Practice; MBSR = Mindfulness Based Stress Reduction; WL = Wait-list Control. M = mean. SD = standard deviation. Pre = Right before the intervention; Post = 1 week after the intervention; 1 M = one month after the intervention; 3 M = three months after the intervention; 6 M = six months after the intervention.

Table 4. *Linier Mixed-Effect Model Tests of Outcome Variables by Time and Condition Using Completers' and ITT Dataset*

		Completers' Dataset				ITT Dataset				
Measure	Model effect	*β*	*df*	*t*	*p*	*β*	*df*	*t*	*p*	95% CI
Perceived Stress	Time1	0.08	86.80	1.10	.273	0.06	124.00	0.77	.444	-0.10, 0.22
	Time2	-0.03	32.98	-1.28	.211	-0.03	100.23	-1.07	.288	-0.08, 0.02
	Time1* MBSP	-0.15	87.72	-1.57	.121	-0.12	138.51	-1.06	.291	-0.34, 0.10
	Time2* MBSP	0.01	33.72	0.18	.855	0.01	121.57	0.18	.855	-0.06, 0.07
	Time1* MBSR	-0.33**	40.65	-2.85	.007	-0.30*	171.75	-2.61	.010	-0.53, -0.07
	Time2* MBSR	0.03	87.13	1.15	.252	0.02	130.85	0.80	.428	-0.04, 0.08
Well-being	Time1	-0.95	33.96	-1.39	.173	-0.71	152.17	-0.98	.328	-2.15, 0.72
	Time2	0.22	31.25	1.20	.240	0.21	119.27	1.07	.286	-0.18, 0.60
	Time1* MBSP	1.64†	33.63	1.74	.091	1.42	165.32	1.42	.157	-0.56, 3.40
	Time2* MBSP	-0.09	32.09	-0.34	.734	-0.07	133.44	-0.26	.792	-0.61, 0.46
	Time1* MBSR	2.02*	36.99	2.13	.040	1.91†	166.92	1.87	.063	-0.10, 3.93
	Time2* MBSR	-0.06	81.95	-0.25	.804	-0.08	115.67	-0.30	.765	-0.58, 0.43
Job Satisfaction	Time1	-0.15†	55.83	-1.91	.061	-0.10	158.13	-1.05	.293	-0.29, 0.09
	Time2	-0.01	33.37	-0.53	.597	-0.02	103.15	-0.67	.506	-0.08, 0.04
	Time1* MBSP	0.28*	54.92	2.53	.014	0.20	167.46	1.48	.142	-0.07, 0.47
	Time2* MBSP	-0.01	33.78	-0.16	.875	0.01	101.49	0.23	.818	-0.07, 0.09
	Time1* MBSR	0.34*	35.35	2.61	.013	0.29†	154.78	1.88	.062	-0.01, 0.59
	Time2* MBSR	0.01	54.15	0.23	.823	0.00	93.16	0.02	.984	-0.07, 0.08
Task Performance	Time1	0.00	39.85	-0.05	.961	0.00	158.31	-0.02	.984	-0.16, 0.16
	Time2	0.03*	90.33	2.00	.049	0.03	115.86	1.26	.209	-0.01, 0.07
	Time1* MBSP	0.20†	39.85	1.79	.081	0.17	148.71	1.43	.154	-0.06, 0.39
	Time2* MBSP	-0.06*	90.41	-2.57	.012	-0.05†	105.88	-1.78	.078	-0.11, 0.01
	Time1* MBSR	-0.04	35.07	-0.42	.678	-0.03	126.33	-0.30	.764	-0.23, 0.17
	Time2* MBSR	-0.01	49.45	-0.64	.523	0.00	108.21	-0.04	.966	-0.06, 0.06

Note. MBSP = Mindfulness Based Strengths Practice; MBSR = Mindfulness Based Stress Reduction; WL = Wait-list Control. ITT = Intent-to-treat. *M* = mean. *SD* = standard deviation. β = Beta coefficient; *df* = degree of freedom, *t* = T-ratio; 95% CI = 95% confidence interval. Negative coefficients indicate that participants in the intervention condition had greater decrease over the specific time compared to Wait-list Control participants. Positive coefficients indicate that participants in the intervention condition had greater gains over the specific time compared to Wait-list Control participants. Separate analyses were conducted for MBSP and MBSR. Due to space limit, we only included the intervention effects for both models, and depicted the time effects for MBSP, as they did not vary much across the two models.
† $p < .01$, * $p < .05$.

As shown in Table 4, generally, there was no time-related effect for all the outcome variables with only two exceptions, namely Time1 of the job satisfaction and Time2 of task performance, which means that the participants in the Wait-list Control became lower in job satisfaction from Month 0 to Month 2 and higher in task performance from Month 2 to Month 8. This should be taken into consideration while interpreting our results. The model showed significant intervention effects as expected (i.e., evaluated by examining the Time1*Condition interaction and Time2*Condition interaction). Compared to the waitlist control group, the models predicted (1) a significant decrease in perceived stress (β= 0.33, p=.007) and a significant increase in well-being (β = 2.02, p = .040) for participants in the MBSR condition and a marginally significant increase (β = 1.64, p = .091) in well-being for participants in MBSP condition from the pre-test to the post-test; (2) a significant increase in job satisfaction for both participants in the MBSP condition (β = 0.28, p = .014) and participants in the MBSR condition (β = 0.34, p = .013) from the pretest to the posttest; (3) a marginally significant increase in task performance (β = 0.20, p = .081) from the pretest to the posttest and a significant decrease in task performance (β = -0.06, p = .012) from post-test to follow-up tests for participants in the MBSP condition, partially confirming hypotheses 1 and 2. No interaction effect on perceived stress, well-being and job satisfaction was found for the Time2*Condition, meaning the effect did not drop up to six months after the intervention. Figure 2 visualized the findings. The results using the ITT datasets showed a similar pattern with a slight decrease in the β coefficients[6]. All the estimates obtained from the completers' datasets fell within the 95% confidence intervals of the imputed estimates, which showed that comparable results would have been obtained if there had been no dropouts over time.

[6] The effects were not statistically significant in the models based on imputed data, but this is likely due to anomalies produced by MI when dealing with skewed data.

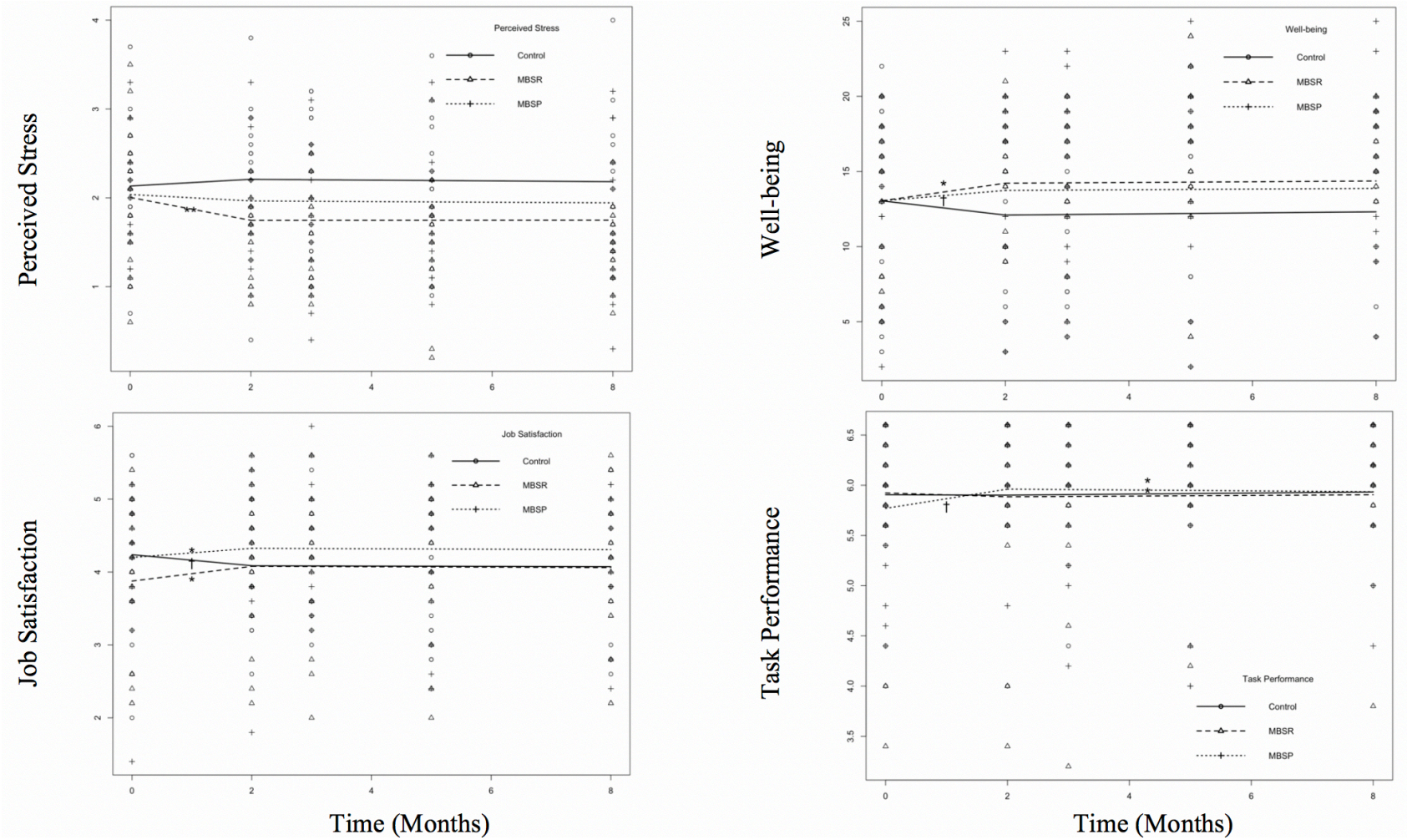


Figure 2. Outcome variables over Time by Condition (pretest [Month 0], posttest [Month 2]) and follow-up tests [Month 3, 5, and 8]).

MBSP = Mindfulness Based Strengths Practice; MBSR = Mindfulness Based Stress Reduction; WL = Wait-list Control.

† $p < .01$, * $p < .05$, ** $p < .01$.

Test of hypothesized Mediators

As shown in the previous section, the participants in the MBSP condition showed an increase in job satisfaction and task performance over Time1. In the next step, we tested whether the applicability of character strengths could serve as a mediator for the intervention effect of the MBSP on the work-related outcomes. More specifically, we tested (1) whether the intervention effect of MBSP on job satisfaction was mediated by the applicability of work-satisfaction-related character strengths at the workplace, (i.e., the applicability of curiosity, wisdom, bravery, perseverance, zest, love, social intelligence, and hope), and (2) whether the intervention effect of MBSP on task performance was mediated by the applicability of participants' top character strengths at work. We tested the applicability of the top 3 strengths, the top 7 strengths, and the top 4^{th} to 6^{th} strengths separately. The results of the four criteria for the mediation analysis were displayed in Table 5.

Table 5. *Test of Hypothesized Mediators of the Intervention Effects*

			a (criterion 2)		b (criterion 3)		c (criterion 1)		c' (criterion 4a)		c - c' (criterion 4b)
Measures	Condition	Mediator	β	T-ratio	β	T-ratio	β	T-ratio	β	T-ratio	T-ratio
JSQ	MBSP	ΔAWCS	0.46	3.49**	0.66	2.45***	0.69	3.06**	0.44	1.58	4.62***
TPQ	MBSP	ΔASS7	0.63	5.12***	0.48	0.04*	0.47	2.23*	0.40	1.38	0.96
TPQ	MBSP	ΔASS3	0.71	4.23***	0.30	1.54	0.47	2.23*	0.51	1.83	-0.57
TPQ	MBSP	ΔASS46	0.62	3.84***	0.49	2.36*	0.47	2.23*	0.31	1.18	2.43*

Note. JSQ = Job Satisfaction Questionnaire; TPQ = Task Performance Questionnaire; MBSP = Mindfulness Based Strengths Practice; MBSR = Mindfulness Based Stress Reduction; AWCS = Applicability work-satisfaction-related character strengths; ASS7 = Applicability of the top 7 strengths of the participant; ASS3 = Applicability of the top 3 strengths of the participant; ASS46 = Applicability of the top 4th to 6th strengths of the participant. β = Beta coefficient; Δ = change.
* $p < .05$, ** $p < .01$, ***$p < .001$.

As displayed in Table 5, we found significant mediation effect as expected: The intervention effect of MBSP on job satisfaction was mediated by the applicability of work-satisfaction-related character strengths at the workplace, and the intervention effect of MBSP on task performance was mediated by the applicability of participants' top 4th to 6th character strengths at work, but not the applicability of the top three strengths or the top seven strengths. Criterion 1 – Participants in the MBSP condition showed significantly greater increases in job satisfaction ($c = 0.69$, $p < .01$) and task performance ($c = 0.47$, $p < .05$) than participants in the Wait-list Control group. Criterion 2 – Participants in the MBSP condition showed significantly greater increases in the applicability of the work-satisfaction-related character strengths ($a = 0.46$, $p < .01$) and the applicability of the top 4th to 6th strengths ($a = 0.62$, $p < .001$) than participants in the Wait-list Control group. Criterion 3 – The change in the applicability of the work-satisfaction-related character strengths predicted the change of job satisfaction over time1 ($b = 0.66$, $p < .001$) and the change of the applicability of the top 4th to 6th strengths predicted the change of task performance over time1 ($b = 0.49$, $p < .05$). Criterion 4 – The significant effect of the MBSP condition on job satisfaction was reduced after controlling for the change of the applicability of work-satisfaction-related character strengths ($c' = 0.44$, $p > .05$) and the reduction (c-c') is significantly different from zero ($t = 4.62$, $p < .001$); the significant effect of the MBSP condition on task performance was also reduced after controlling for the change of the applicability of the top 4th to 6th strengths ($c' = 0.31$, $p > .05$) and the reduction (c-c') was significantly different from zero, as well ($t = 2.43$, $p < .05$).

Discussion

The study shows that the MBSR is effective for increasing well-being, reducing perceived stress, and increasing job satisfaction (the effect is sustained for up to 6 months), while the MBSP is effective for increasing well-being, job satisfaction (the effect is sustained for up to 6 months) and task performance (only effective right after the intervention). The

study also demonstrated that the applicability of the work-satisfaction-related character strengths mediated the effect of the MBSP on job satisfaction, while the applicability of the top 4th to 6th strengths mediated the effect of MBSP on task performance.

When comparing the effect of the MBSP with the well-established MBSR at the workplace, the MBSR seems to function better when regarding employee well-being as reported in the previous studies (Aikens et al., 2014; Baccarani, et al., 2013; Hülsheger et al., 2013), whereas the MBSP seems to be more effective when regarding employee performance. This is in accordance with the findings of a recent study (Hafenbrack & Vohs, 2018), in which they used five experiments and two meta-analyses, suggesting that mindfulness meditation might impair task motivation. They also argued that the performance does not decrease despite reducing motivation because mindfulness decreases concerns about stressors and increases the task focus (Hafenbrack & Vohs, 2018). Our findings suggest that, maybe due to the impairment of motivation, the mindfulness-only training did not work as well for task performance. However, fusing character strengths with the mindfulness training seems to buffer the impairment of participants' motivation and thus bolster their task performance.

The mediators of the intervention effects were chosen based on evidence from previous studies. On the one hand, it is straightforward to select the strengths that were robustly related to work satisfaction across studies as a mediator for the job satisfaction effect. On the other hand, it is not that easy to justify the choice of the signature strengths as a mediator for the task performance effect because there are still debates on how to operationalize signature strengths, in general. It could be any number from the top three to the top seven of the rank order listing of the 24 strengths (Peterson & Seligman, 2004). Yet, the number "four" seemed to be an inflection point for the positive effects at the workplace (Harzer & Ruch, 2012). Therefore, in our current study, we wanted to identify what works best despite the lack of a comprehensive theory, thus testing the top 3, the top 7 as well as the top 4th to top 6th strengths separately. The reason why the applicability of the top 4th to top 6th

strengths is more important than the top 3 or top 7 strengths might be explained by the fact that the slightly lower ranking signature strengths left more room for change. This finding needs to be interpreted with caution as a replication is needed involving participants with a larger sample size.

A unique contribution of the current study is that we segmented the time variable into two different variables to represent the acute intervention phase and the follow-up phase. In doing so, we were able to capture the non-linear trend within the data, which is an improvement compared to the traditional strategies which conceptualize time with a single linear function or add additional variables such as treatment completion (Sergeant & Mongrain, 2014). The piecewise growth model was able to depict the intervention and follow-up effect in one simple model, illustrating whether there is an effect right after the intervention and whether the intervention effect lasts until the follow-ups.

Limitations and future research directions

Several limitations of this study should be acknowledged. First, the sample size is comparatively small although it was balanced, with respect to the demographics, and outliers were checked before the analysis. Therefore, the problems associated with a small sample size might apply, including low statistical power and capitalization on chance. Some of the non-significant results might be explained by the small sample size and we could not conclude that the interventions did not work for those outcomes; it might just be due to the small sample size that we could not detect these effects. Consequently, the significant findings reported above might also not be conclusive and should be replicated in a larger sample. Second, the randomization of the participants was constrained due to participants' availability. We admit that this is a compromise between an ideal experimental design and reality. It is a lot to ask our participants to take part in the study, which lasts in total almost 10 months from the moment they registered on our website until all the follow-up measures were completed. Still, we managed to attract and maintain a good number of participants from a variety of job

branches. It is also understandable that as working adults they are not available every evening and we have to adjust our randomization accordingly. Thus, when interpreting our results, this should also be taken into consideration. However, we believe that the randomization works well because no significant baseline differences were detected across the three conditions, indicating no evidence of a systematic bias. Third, the supervisory-rated task performance was positively skewed, and this might have lowered the effectiveness of the intervention. Therefore, it will be of interest to use a more objective measure of performance in future studies. Fourth, several reminders were sent out if the participants forgot to fill out the questionnaires at the relevant time points, which meant that there were gaps of when participants were filling out the questionnaires (within 1-2 weeks). This could potentially have biased the results because too many rounds of reminders might have caused an aggravation towards the questionnaire. Fifth, since it is the very first study to look at the effectiveness of MBSP empirically at the workplace, we only included subjective reports. Measures capturing meaningful workplace behaviors such as sick leaves, turnover rates etc. as outcomes should have been included, as well. According to previous studies, our interventions (mindfulness or mindfulness combined with character strengths) are likely to have those effects on workplace related-behavior: Dane and Brummel (2013) found a negative relation between mindfulness and turnover intention (although it became non-significant when controlling for work engagement); in a study of 832 employees across 96 departments, strengths use support reduced absenteeism among workers with a high workload and high emotional demands (van Woerkom, Bakker, & Nishii, 2016). Future studies should consider including those behavior measures.

Despite the limitations, there are exciting future directions for this research. The current study compared only three conditions: a “mindfulness only”-training, a combined training of mindfulness and character strengths, and a Wait-List Control. Future studies could add a new condition, namely a “character strength only”-training group to further distinguish

between the effects. Is the effect due to mindfulness, or character strengths, or a combination of the two, and which effect is stronger? Future studies could also use a more objective measure of performance or look at the other aspects of performance at work since the measures we used were rather focused on the task itself and there was little room for it to be changed. Moreover, other mediators could also be investigated, such as, we could investigate whether the two interventions also predict workplace atmosphere, work relationship etc. and thus have an impact on the outcomes. As outcomes, the current research focused rather on the general well-being, we could well imagine that the future studies could expand the interest in other aspects of well-being, such as the PERMA model.

Implications for organizations

These findings have several important practical implications for organizations. Both of the interventions showed effects on job satisfaction. A number of recent workplace studies have shown that by focusing on increasing job satisfaction amongst the team, the organization can realize a range of benefits, including lower employee turnover (e.g., Tooksoon, 2011), higher company productivity (e.g., Böckerman & Ilmakunnas, 2012) and more organizational citizenship behavior (e.g., Koys, 2001), which could lead to a more productive workforce and higher rates of business success. The task performance only increased when character strengths have been fused into the mindfulness training. These findings suggest that integrating character strengths allows organizations to buffer the impairment on motivation that mindfulness alone might cause. Thus, if improving performance is the ultimate goal, fusing character strengths on top of the mindfulness training might be a good forethought.

Our results also suggest that some effects of the mindfulness interventions do not vanish even when regarding longer time periods (up to six months after the intervention). We believe that the reason for the effects to last until six months after the interventions is mainly explained by our participants continuing to practice their exercises even after the interventions ended. Maybe asking them to fill out the questionnaires served as a reminder for them to

continue practicing the exercises at home. We also believe that a considerable number of participants were more willing to practice on their own because we provided them with a website and audio tapes, and all the resources were easily available to them. These results have implications for the organizations on how they could implement mindfulness training. The organizations might consider facilitating their employees' training experiences with training websites and audio tapes, as well as sending out newsletters regularly (but not too often). Although the acute training period is essential, the continued engagement might be an important factor in explaining the continued effect of an intervention.

As mentioned in the limitation, the results of the current study do not encourage the misuse of mindfulness and well-being trainings at workplace. Although this training programs are effective for improving psychological well-being of the employees as well as productivities in the workplace, the owner or the employer of the organizations should consider not creating too much distress at workplace in the first place and take measures to improve the working conditions before implementing those programs.

Conclusion

The present research suggests that mindfulness interventions are useful resources for facilitating employees' well-being and performance. Mindfulness alone seems to function better when regarding psychological well-being at work, while the combination of character strengths and mindfulness seems to influence the participants on a motivational level and thus bolsters task performance.

References

Aikens, K., Astin, J., Pelletier, K., Levanovich, K., Baase, C., Park, Y., & Bodnar, C. (2014). Mindfulness Goes to Work: Impact of an Online Workplace Intervention. *Journal of Occupational and Environmental Medicine*, *56*, 721-731. http://dx.doi.org/10.1097/JOM.0000000000000209

Andrews, F. M., & Withey, S. B. (1976). *Social indicators of well-being*. New York, NY: Plenum Press.

Baccarani, C., Mascherpa, V., & Minozzo, M. (2013). Zen and well-being at the workplace. *The TQM Journal, 25*, 606-624. http://dx.doi.org/10.1108/TQM-07-2013-0077

Barnard, J. & Rubin, D.B. (1999). Small sample degrees of freedom with multiple imputation. *Biometrika, 86,* 948-955. https://doi.org/10.1093/biomet/86.4.948

Bates, D., Mächler, M., Bolker, B., Walker, S. (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software, 67*(1), 1–48. http://dx.doi.org/10.18637/jss.v067.i01

Böckerman, P., & Ilmakunnas, P. (2012). The job satisfaction-productivity nexus: A study using matched survey and register data. *ILR Review, 65*, 244-262. https://doi.org/10.1177/001979391206500203

Büssing, A. (2011). Perceived stress scale -10 (PSS-10) [Fragen zum Thema Stress]. Unpublished instrument. Retrieved from http://www.psy.cmu.edu/%7Escohen/German_PSS_10.doc

Cohen, S., & Williamson, G. (1988). Perceived stress in a probability sample of the United States. In S. Spacapan & S. Oskamp (Eds). *The social psychology of health: Claremont Symposium on applied social psychology* (pp. 31-67). Thousand Oaks, CA: Sage Publications.

Dane, E., & Brummel, B. J. (2014). Examining workplace mindfulness and its relations to job performance and turnover intention. *Human Relations*, *67*, 105-128. https://doi.org/10.1177/0018726713487753

Diefendorff, J. M., Brown, D. J., Kamin, A. M., & Lord, R. G. (2002). Examining the roles of job involvement and work centrality in predicting organizational citizenship behaviors and job performance. *Journal of Organizational Behavior, 23*, 93-108. http://dx.doi.org/10.1002/job.123

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*, 175-191. http://dx.doi.org/10.3758/BF03193146

Freedman, L. S., & Schatzkin, A. (1992). Sample size for studying intermediate endpoints within intervention trials or observational studies. *American Journal of Epidemiology, 136*, 1148-1159. http://dx.doi.org/10.1093/oxfordjournals.aje.a116581

Gander, F., Proyer, R. T., Ruch, W., & Wyss, T. (2012). The good character at work: An initial study on the contribution of character strengths in identifying healthy and unhealthy work-related behavior and experience patterns. *International Archives of Occupational and Environmental Health*, *85*, 895-904. http://dx.doi.org/10.1007/s00420-012-0736-x

Glomb, T. M., Duffy, M. K., Bono, J. E., & Yang, T. (2011). Mindfulness at work. In J. Aparna, H. Liao, & J. J. Martocchio (Eds.), *Research in personnel and human resources management* (Vol. 30, pp. 115 - 157). Bradford, England: Emerald Group Publishing Limited.

Good, D. J., Lyddy, C. J., Glomb, T. M., Bono, J. E., Brown, K. W., Duffy, M. K., . . . Lazar, S. W. (2016). Contemplating mindfulness at work: An integrative review. *Journal of Management, 42*, 114–142. http://dx.doi.org/10.1177/0149206315617003

Hafenbrack, A. C., & Vohs, K. D. (2018). Mindfulness meditation impairs task motivation but not performance. *Organizational Behavior and Human Decision Processes, 147*. Advance online publication. http://dx.doi.org/doi/10.1016/j.obhdp.2018.05.001

Harzer, C., & Ruch, W. (2012). When the job is a calling: The role of applying one's signature strengths at work. *Journal of Positive Psychology, 7,* 362-371. http://dx.doi.org/10.1080/17439760.2012.702784

Harzer, C., & Ruch, W. (2013). The application of signature character strengths and positive experiences at work. *Journal of Happiness Studies*, *14*, 965-983. http://doi.org/10.1007/s10902-012-9364-0

Harzer, C., & Ruch, W. (2014). The role of character strengths for task performance, job dedication, interpersonal facilitation, and organizational support. *Human Performance, 27*, 183-205. http://dx.doi.org/10.1080/08959285.2014.913592

Harzer, C., & Ruch, W. (2016). Your strengths are calling: Preliminary results of a web-based strengths intervention to increase calling. *Journal of Happiness Studies*, *17*, 2237-2256. 10.1007/s10902-015-9692-y

Hodges, T. D., & Asplund, J. (2010). Strengths development in the workplace. In P. A. Linley, S. Harrington, & N. Garcea (Eds.), *Oxford handbook of positive psychology at work* (pp. 213–220). New York, NY: Oxford University Press.

Honaker, J., King, G., Blackwell, M. (2011). Amelia II: A program for missing data. *Journal of Statistical Software, 45*(7), 1–47. http://dx.doi.org/10.18637/jss.v045.i07

Hülsheger, U. R., Alberts, H. J., Feinholdt, A., & Lang, J. W. (2013). Benefits of mindfulness at work: The role of mindfulness in emotion regulation, emotional exhaustion, and job satisfaction. *Journal of Applied Psychology*, *98*, 310- 325. http://dx.doi.org/10.1037/a0031313.

Ivtzan, I., Niemiec, R. M., & Briscoe, C. (2016). A study investigating the effects of Mindfulness-Based Strengths Practice (MBSP) on wellbeing. *International Journal of Wellbeing*, *6*. http://dx.doi.org/10.5502/ijw.v6i2.557

Jamieson, S. D., & Tuckey, M. R. (2017). Mindfulness interventions in the workplace: A critique of the current state of the literature. *Journal of occupational health psychology, 22*, 180-193. http://dx.doi.org/10.1037/ocp0000048

Kabat-Zinn, J. (1982). An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: Theoretical considerations and preliminary results. *General Hospital Psychiatry*, *4*, 33-47. http://dx.doi.org/10.1016/0163-8343(82)90026-3

Kabat-Zinn, J. (1990). *Full catastrophe living*. New York, NY: Dell.

Kabat-Zinn, J. (1994). *Wherever you go, there you are: Mindfulness meditation in everyday life*. New York, NY: Hyperion.

Klatt, M. D., Buckworth, J., & Malarkey, W. B. (2009). Effects of low-dose mindfulness-based stress reduction (MBSR-ld) on working adults. *Health Education & Behavior, 36*, 601–614. http://dx.doi.org/10.1177/1090198108317627

Koys, D. J. (2001). The effects of employee satisfaction, organizational citizenship behavior, and turnover on organizational effectiveness: A unit-level, longitudinal study. *Personnel Psychology, 54*, 101-114. https://doi.org/10.1111/j.1744-6570.2001.tb00087.x

Niemiec, R. M. (2013). *Mindfulness and character strengths: A practical guide to flourishing*. Boston, MA: Hogrefe Publishing.

Niemiec, R. M. (2014). Mindfulness-based strengths practice (MBSP) for physicians: Integrating core areas to promote positive health. In M. W. Snyder (Ed.), *Positive Health: Flourishing lives, Well-being in doctors* (pp. 247–263). Bloomington, IN: Balboa Press.

Niemiec, R. M., & Lissing, J. (2016). Mindfulness-based strengths practice (MBSP) for enhancing well-being, managing problems, and boosting positive relationships. In I. Ivtzan, T. Lomas (Eds.), *Mindfulness in positive psychology: The science of meditation and wellbeing* (pp. 15-36). London, UK: Routledge

Pang, D., & Ruch. W. (2018). *The mutual support model of mindfulness meditations and character strengths*. Manuscript under review.

Park, N., Peterson, C., & Seligman, M. E. P. (2004). Strengths of character and well-being. *Journal of Social and Clinical Psychology*, *23*, 603-619. http://dx.doi.org/10.1521/jscp.23.5.603.50748

Peterson, C., & Seligman, M. E. P. (2004). *Character strengths and virtues: A handbook and classification*. New York, NY: Oxford University Press.

Peterson, C., Stephens, J. P., Park, N., Lee, F., & Seligman, M. E. P. (2010). Strengths of character and work. In P. A. Linley, S. Harrington, & N. Garcea (Eds.), *Oxford handbook of positive psychology and work* (pp. 221–234). New York, NY: Oxford University Press.

Reb, J., Narayanan, J., & Chaturvedi, S. (2014). Leading mindfully: two studies on the influence of supervisor trait mindfulness on employee well-being and performance. *Mindfulness, 5*, 36–45. http://dx.doi.org/10.1007/s12671-012-0144-z

Rentsch, J. R., & Steel, R. P. (1992). Construct and concurrent validation of the Andrews and Withey job satisfaction questionnaire. *Educational and Psychological Measurement*, *52*, 357-367. http://dx.doi.org/10.1177/0013164492052002011

Ruch, W., Huber, A., Beermann, U., & Proyer, R. T. (2007). Character strengths as predictors of the “good life” in Austria, Germany and Switzerland. In Romanian Academy, “George Barit” Institute of History, Department of Social Research (Ed.), *Studies and researches in social sciences* (Vol. 16, pp. 123-131). Cluj-Napoca, Romania: Argonaut Press.

Ruch, W., Weber, M., Park, N. & Peterson, C. (2014). Character strengths in children and adolescents. *European Journal of Psychological Assessment, 30*, 57-64. http://dx.doi.org/10.1027/1015-5759/a000169.

Schafer, J. L., & Graham, J. W. (2002). Missing data: Our view of the state of the art. *Psychological Methods, 7*, 147-177. http://dx.doi.org/10.1037/1082-989X.7.2.147

Sergeant, S., & Mongrain, M. (2014). An online optimism intervention reduces depression in pessimistic individuals. *Journal of Consulting and Clinical Psychology, 82*, 263-274. http://dx.doi.org/10.1037/a0035536

Shao, R., & Skarlicki, D. P. (2009). The role of mindfulness in predicting individual performance. *Canadian Journal of Behavioural Science/Revue canadienne des sciences du comportement, 41*, 195-201. http://dx.doi.org/10.1037/a0015166

Stice, E., Presnell, K., Gau, J., & Shaw, H. (2007). Testing mediators of intervention effects in randomized controlled trials: An evaluation of two eating disorder prevention programs. *Journal of Consulting and Clinical Psychology*, *75*, 20-32. http://dx.doi.org/10.1037/0022-006X.75.1.20

Tooksoon, H. M. P. (2011). Conceptual framework on the relationship between human resource management practices, job satisfaction, and turnover. *Journal of Economics and Behavioral Studies, 2*, 41-49.

Van Buuren, S., & Groothuis-Oudshoorn, K. (2011). Mice: Multivariate imputation by chained equations in R. *Journal of Statistical Software, 45*(3), 1-67. http://dx.doi.org/10.18637/jss.v045.i03

Van Woerkom, M., Bakker, A. B., & Nishii, L. H. (2016). Accumulative job demands and support for strength use: Fine-tuning the job demands-resources model using conservation of resources theory. *Journal of Applied Psychology, 101*, 141-150. http://dx.doi.org/10.1037/apl0000033

Williams, L. J., & Anderson, S. E. (1991). Job satisfaction and organizational commitment as predictors of organizational citizenship and in-role behaviors. *Journal of Management*, *17*, 601-617. http://dx.doi.org/10.1177/014920639101700305

Wolever, R. Q., Bobinet, K. J., McCabe, K., Mackenzie, E. R., Fekete, E., Kusnick, C. A., & Baime, M. (2012). Effective and viable mind-body stress reduction in the workplace: A randomized controlled trial. *Journal of Occupational Health Psychology, 17*, 246–258. http://dx.doi.org/10.1037/a0027278

World Health Organization. (1990). *International statistical classification of diseases and related health problems* (10th rev. ed.). Geneva, Switzerland: World Health Organization.

Wrzesniewski, A., McCauley, C. R., Rozin, P., & Schwartz, B. (1997). Jobs, careers, and callings: People's relations to their work. *Journal of Research in Personality, 31*, 21-33. http://dx.doi.org/10.1006/jrpe.1997.216

GENERAL DISCUSSION

Overview of the main results

Part I

Part I of the thesis provided empirical answers to the issues of the observing facets of the FFMQ. It could be a combination of three different reasons: (1) the non-normality nature of the FFMQ; (2) the heterogeneous sampling, which leads to the different procedures of the cultivation as well extinction of the five facets; and (3) differences between laypersons and meditators on how they do their observing. This part of the present thesis emphasized an understudied sample –participants with previous experience but who stopped practicing for a while (namely, the past meditators) and enriched the results by using multiple innovative analyses, including the hierarchical factor analysis, the confirmatory factor analysis and the cluster analysis.

Non-normality nature of the FFMQ. We found evidence that three scales of the FFMQ were constrained (i.e., observing, describing, and non-judging) and skewed to different extents. The non-meditators and the past meditators showed positive skewing for the facets of observing, describing, and non-judging, while in addition to those the current meditators showed positive skewing also for the non-reacting facet. Specifically, more than 15% of the respondents of the observing, describing, and non-judging items reached the highest scorable value (i.e., 5): 24.6, 25.9, and 32.0% for the current meditators, 19.7, 20.0, and 23.8% for the past meditators, and 15.7, 17.6, and 22.9% for the non-meditators.

Heterogeneous sampling. We found that participants' different levels of experience of meditation can influence their scoring of the FFMQ (e.g., mean, inter-correlations of the five facets, and the loading on an overall factor). The unique features of past meditators were for the first time revealed in the present study. Past meditators scored similarly to the non-meditators in acting with awareness, non-judging, and non-reacting, but scored higher in

observing and describing. Past meditators with intensive training scored higher in all five facets than past meditators who practiced less. It should also be noted that the increase in scores for the facets when practicing mindfulness or its decrease after ceasing meditation in scores for the facets can differ in speed. The results supported the hypothesis that the past meditators should be separated from the current meditators and the non-meditators and be investigated as an independent sample. This could avoid heterogeneous sampling, which potentially contributes to the discrepancy found with the FFMQ.

Differences between laypersons and meditators on how they observe. The results of the HFA illustrated a clear picture of how the observing facet loaded differently across the three samples on the overall construct of mindfulness. For the non-meditators, instead of being fused with other items into one factor, observing became a separate factor quite early (third level), while for the current meditators and the past meditators, there were more levels on which observing items were fused with the items from other facets (i.e., awareness and non-reacting). This could provide statistical support for the statement that meditators and non-meditators observe in a different manner, with the former being more likely to observe mindfully and the latter being more likely to observe without being attentive and non-reactive.

Part II

Part II of the thesis presented two studies to investigate the relationships between mindfulness (and its facets) and character strengths within the framework of the VIA classification (Peterson & Seligman, 2004). We observed meaningful relationships between the two constructs and the findings indicated initial evidence for the mutual support model of mindfulness and character strengths.

List of character strengths that overlap with mindfulness. In Study 1, a list of character strengths was put forward which was considered to overlap with mindfulness and its facets, i.e., creativity, curiosity, open-mindedness, love of learning, perspective, bravery, perseverance, zest, love, social intelligence, forgiveness, self-regulation, appreciation of

beauty, gratitude, hope and spirituality. These are the strengths that correlated with mindfulness or at least one facet of mindfulness (with medium to large effect sizes), or were notably different between the current meditators and the non-meditators (with medium to large effect sizes). Based on these results, as well as the theoretical connections of the two constructs, a mutual support model of mindfulness and character strengths was proposed: certain character strengths (e.g., curiosity) are assumed to facilitate mindfulness (i.e., people with these character strengths are more willing to try mindfulness meditations) and the mastery of mindfulness is assumed to enhance certain character strengths (e.g., spirituality).

Testing one path of the mutual support model. In Study 2, the mutual support model was tested empirically, and more specifically, we tested which character strengths were enhanced through mindfulness training. Of the proposed list of character strengths that were considered to overlap with mindfulness (based on Study 1), the following character strengths showed significant increase after an eight-week training of MBSR in comparison to the waitlist control group: love, appreciation of beauty, gratitude, and spirituality; and the following character strengths showed a trend towards significance: zest and bravery. Except for love and gratitude, which dropped slightly at the six-month follow-up test, the remaining increased strengths maintained their score level.

Part III

Given the interconnection of mindfulness and character strengths, Part III of the thesis examined the effectiveness of a well-established mindfulness training (MBSR) and a newly developed training combining the two practices (MBSP) on well-being and work-related outcomes; the potential mediators (i.e., application of character strengths) of the effects at work were also tested.

The Effectiveness of MBSR and MBSP. Compared to the waitlist control group, participants in the MBSR condition showed a significant decrease in perceived stress and well-being, and a significant increase in job satisfaction from the pre-test to the post-test.

Participants in the MBSP condition showed a significant increase in job satisfaction, a marginally significant increase in well-being and task performance from the pre-test to the post-test, and a significant decrease in task performance from post-test to follow-up test all in comparison to the waitlist control group. The training effects did not drop after up to six months after the intervention.

Mediators of the work-related outcomes. Hence, we found significant mediation effect as expected: The intervention effect of MBSP on job satisfaction was mediated by the applicability of work-satisfaction-related character strengths at the workplace, and the intervention effect of MBSP on task performance was mediated by the applicability of participants' top 4th to 6th character strengths at work.

Beyond the current findings

Caution warranted when using the FFMQ

The findings of Part I suggest that when using the FFMQ to measure mindfulness as a dispositional trait, we need to consider the skewness of specific scales, especially when heterogenous samples were used and compared. Future researcher might think of adapting the scale by using a 7-Likert Scale instead of 5-Likert Scale or increasing the difficulty of the items. Additionally, the HFA results confirmed that observing might be understood differently for laypersons than for experts in mindfulness. This was in line with the fact that mindfulness training taught participants to observe the internal and external phenomena with an accepting, non-judging, and non-reactive stance, even if they are *unpleasant* (Hayes, Strosahl, & Wilson, 1999; Segal et al., 2013). However, this accepting way of observing could be very difficult for non-meditators to do. Therefore, when using the FFMQ, especially when the sample contains of people with different levels of meditation experience, it is important to also include the scores of each facet beyond the total score.

Cultivation and extension procedures of mindfulness

The unique features of past-meditators have been revealed for the first time in the current thesis. The results suggest that the cultivation of the different facets may not be a linear relationship. Not all five facets are enhanced with the same speed and fade with the same speed. Future studies could focus on this specific group and collect additional information to investigate the specific factors that influence the cultivation and extension of the five mindfulness facets. We could ask questions such as why they stopped meditation, since when they have stopped their practice, whether they had intensive training in the past etc. Moreover, the practicing experience alone is not the full picture, other factors such as participants' education, personal experiences, and their cognitive ability (e.g., memory and learning) could also influence their mastery of mindfulness skills.

An upward spiral process

The findings of Part II suggest that mindfulness and character strengths mutually enhance one another, creating the dynamics of an upward spiral: increases in mindfulness predict enhancement in specific character strengths, while increases in specific character strengths were assumed to predict growth in mindfulness (to be tested separately). Mindfulness broadens one's perspectives and individuals become more aware of the current situation they find themselves in (e.g., greater awareness of the "basic goodness" in life; Garland, Gaylord, & Fredrickson, 2011), which might counteract the "negativity bias" (whereby people tend to notice negative information more than positive information; Vaish, Grossmann, & Woodward, 2008). This could result in an increasing awareness of one's character strengths. As an individual begins to be more attentive in general, they should also be in a better position to spot their character strengths and notice the environments in which to apply them. In a similar vein, when an individual is more aware of their his/her signature strengths (e.g., curiosity and perseverance) and can apply them in a fitting environment, it is easier for him/her to experience positive emotions (strengths-environment fit, Harzer & Ruch, 2013; Harzer et al., 2017), which leads to them starting to practice mindfulness as well as

maintaining and facilitating the practice in the future. The practice can then further lead to meaning and well-being, and also likely to personal growth and actualization. This finding joins growing evidence of the reciprocal dynamics of upward spirals of positive psychological processes (e.g., Burns et al., 2008; Fredrickson, Tugade, Waugh, & Larkin, 2003). Figure 3 displays an idea of the upward spiral process.

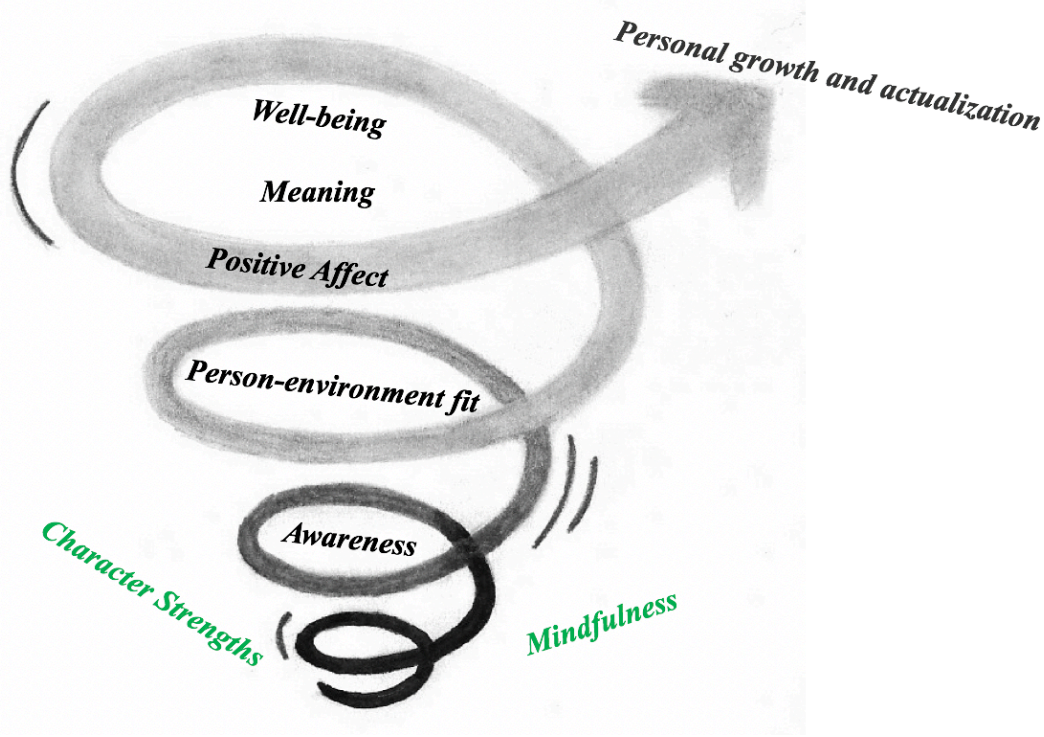


Figure 3. The upward spiral process of mindfulness and character strengths

Part III of the present thesis provided some indirect evidence on this upward spiral process. There were advantages of the MBSP training (which integrated mindfulness and character strengths) in employee performance over the traditional MBSR training. This is consistent with previous studies, which showed inconsistent results regarding the effect of mindfulness on individual performance. Participants in our MBSP group who were asked to train mindfulness and character strengths at the same time, as well as using one another to help the cultivation of each other, showed performance improvements. The reason behind this could be that with the help of mindfulness, they are more aware of their own strengths and more attentive to apply their strengths at work, which creates a better fit between their

personal strengths and their organization (so called P-O fit, Person–Organization fit, Kristof, 1996). The fit between a person and the organization has consistently been reported as a contributor to performance (e.g., Kristof-Brown, Zimmerman, & Johnson, 2005). The use of signature strengths is supposed to be fulfilling and leading to engagement, meaning, and accomplishment (e.g., Harzer & Ruch, 2012; Peterson & Seligman, 2004). This upward spiral process is also well aligned with the Job Demands-Resources (JD-R) literature, emphasizing the value of job resources as motivational potential when job demands are high (Bakker & Demerouti, 2007). Engaging in tasks that capitalize on one's strengths provides additional job resources for employees, so that they are more likely to be successful in achieving their work-related goals (van Woerkom et al., 2016). Fusing character strengths on top of mindfulness training seems to compensate for the traditional mindfulness training's impact on task motivation impairment (Hafenbrack & Vohs, 2018).

Joint or separate pathways toward well-being?

Part III of the thesis suggest that the MBSR training increases the well-being of participants despite the small effect size, which is in accordance with the numerous previous studies on the contribution of mindfulness to well-being (for overviews, see Eberth & Sedlmeier, 2012). Yet, the mechanism of how mindfulness contributes to well-being is not entirely clear. Based on the results of the present thesis, a few assumptions are proposed.

One explanation is based on the results of Part II. The reason why mindfulness training contributes to well-being is because it trains the character strengths that are mostly related to life satisfaction. The five strengths most robustly correlating with life satisfaction are hope, zest, gratitude, love, and curiosity (Brdar & Kashdan, 2010; Buschor et al., 2013; Ruch et al., 2007; Ruch et al., 2010; Shimai et al., 2006). According to Part II of the thesis, three out of the five strengths (i.e., zest, love and gratitude) are enhanced through mindfulness training. This provides some evidence for the statement that mindfulness training contributes to well-being because of its enhancement of life-satisfaction-related character strengths.

However, if we look back to the Buddhist roots of mindfulness, the first explanation might not be so convincing because mindfulness practice aims directly at removing suffering and leaves open the potential to improve well-being, life of meaning and spiritual growth. This could still be a parallel path to the cultivation of the relevant character strengths. A second explanation would be that mindfulness and character strengths provide separate pathways towards well-being, but once they are connected, an upward spiral process will be created to contribute to a more fulfilling life.

Strengths and limitations of the present dissertation

Part I of the present thesis has several strengths, including (1) the use of large samples (N = 2,247); (2) the study of participants with previous meditation experience who have discontinued their practice, which is an understudied group; (3) the use of multiple analyses, such as the hierarchical factor analysis, the confirmatory factor analysis and the cluster analysis, that altogether provided a large array of findings.

Part II of the present thesis offers two unique insights, which may move the field forward. First, this is the very first study to demonstrate the relationship of mindfulness and character strengths in the framework of the VIA classification. This is done due to the strongly increasing interest in implementing mindfulness in the specific context of positive psychology. Second, the mutual support model of mindfulness and character strengths has been put forward, which innovatively points out that the model works in a sort of cyclical fashion. Through enabling increased awareness of ourselves, mindfulness allows us to develop our character strengths to a greater extent; and in return the increased character strengths help us better pay attention and explore the present moment. This shifts our view of the underlying pathways of these two related, but different constructs, which lead to well-being.

Part III of the thesis makes unique contributions in the following aspects: (1) it is the very first study to demonstrate the effectiveness of a newly developed mindfulness

intervention, which integrated character strengths and mindfulness (MBSP) in a work setting using a randomized-controlled design; (2) it demonstrates, whether mindfulness works, with measures at five different time points: before the intervention, one week, one month, three months, and six months after the interventions, which has been often ignored in the previous research; (3) it pointed out the potential mediation role (strengths application) of the MBSP intervention effect in work contexts. These findings could help organizations make better decision about how to facilitate mindfulness at the workplace, such as integrating strengths into the MBIs.

However, several limitations can be found across all three parts of the thesis. First, the use of internet recruitment could cause a selection bias, which could affect the representativeness of the study. The participants in all three parts of the thesis are more likely to be those who were interested in positive psychology in general or were curious about themselves in the first place. Second, the cross-sectional nature of Part I and first part of Part II made it hard to control certain factors such as individual differences (participants' education, personal experiences, and their cognitive abilities). Third, except for one measurement in Part III, there are likely social-desirability effects in the self-reported assessments (especially with regard to character strengths) underlying this research. This suggests that a balanced key version of the VIA-IS (e.g., McGrath, 2017), which is less prone to faking may be worth developing and researchers should additionally try to measure character strengths through peer ratings (Ruch et al., 2011) or structured interviews (Peterson & Seligman, 2004). Forth, no active/placebo control group was used for the intervention study. This leaves open the possibility that demand characteristics and/or placebo effects may have played a role. Yet, since the research of mindfulness at work is still in its early stage, not many studies included a control group or utilized an RCT design (Jamieson & Tuckey, 2017), even less used an active/placebo control group, which has become one of the major critiques of mindfulness research.

One of the critical limitations of the present thesis (involving the second part of Part II and Part III) is that we have tested a lot of variables with a small sample size. This could be problematic in two ways: (1) since multiple hypotheses are tested, the chance of a rare event increases, and therefore, the likelihood of incorrectly rejecting a null hypothesis (i.e., making a Type I error) increases; this has been addressed in the relevant articles by implementing the Bonferroni correction, however, the correction comes at the cost of increasing the probability of producing false negatives; (2) due to the small sample size, problems such as low statistical power and capitalization on chance cannot be completely ruled out.

Implications for research and practice

Toward a more integrated view on psychological research

For a long time, there seem to be two camps representing different views in psychology. Clinical psychology focuses on diagnosing and treating mental, emotional, and behavioral disorders such as substance abuse, depression, anxiety, and eating disorders (Hockenbury, Nolan, & Hockenbury, 2016), while positive psychology's focus is on human strengths which enable individuals and communities to thrive (Seligman & Csikszentmihalyi, 2000). Yet, we must not focus only on the negatives, or only on the positives, but we should have a more balanced, integrated view. More precisely, we could (1) invite clinical psychologists to consider a broader view which goes beyond the treatment and prevention of the pathology; (2) encourage positive psychologists not only to focus on the buffering effects of positive emotions, but also to notice the transformative aspects of negative emotions (Neff & Davidson, 2016). Mindfulness seems to bridge the two by inviting us to welcome all of our experience and explore it with equanimity, discernment, and kindness, no matter if it is distress, anger, or sadness; or joy, optimism, or health (Shapiro et al., 2016). Anger, guilt, anxiety, and other negative emotions are helpful in surprising ways, such as giving us more courage, regulating our behavior, and keeping us alert to our surroundings among many other benefits (Kashdan & Biswas-Diener, 2014).

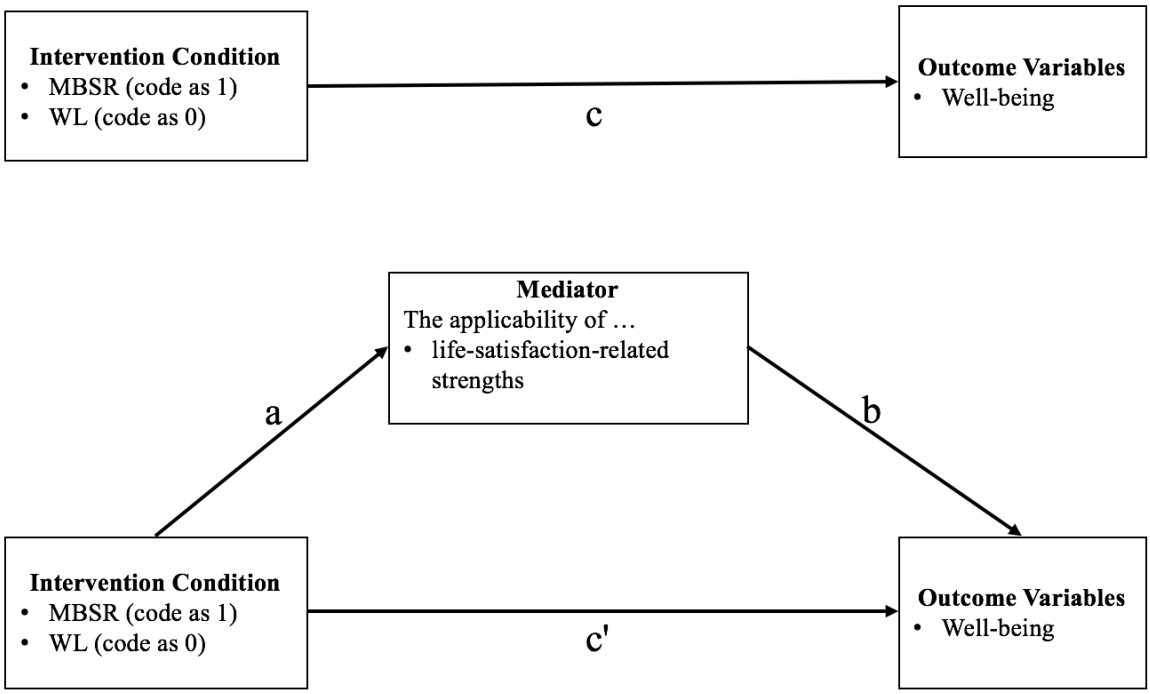


Figure 4. The graphical representation of the hypothesized mediator models.

Preliminary suggestions for mechanism of mindfulness training leading to well-being were proposed in the present thesis. As such, additional research is needed to test the validity of the proposed mechanism. Future research could test whether the effect of mindfulness training on well-being is through character strengths or through a distinct mechanism by investigating the mediation role of life-satisfaction-related character strengths of the effect of mindfulness training on well-being (see Figure 4). Concretely, using statistical models of mediation we could assess: (1) if mindfulness practice increases life-satisfaction-related character strengths (Fig. 4, a); (2) if life-satisfaction-related strengths increase well-being (Fig. 4, b); and (3) if mindfulness practice increases well-being after removing the effect of the mediators (Fig. 4, c'). This was not analyzed in the results of the Part III as it goes beyond the scope of that paper, which focuses more on the workplace outcomes. These results were analyzed and displayed in Table 7.

Table 6. *Test of Hypothesized Mediators (life-satisfaction-related-strengths) of the Intervention Effect on Well-being*

			a (cri 2)		b (cri 3)		c (cri 1)		c' (cri 4a)		c - c' (cri 4b)
Measure	Condition	Mediator	β	T	β	T	β	T	β	T	T
WHO-5	MBSR	ΔLSCS	0.06	0.43	3.70	2.69*	5.19	2.64*	5.00	2.54*	0.97

Note. WHO-5 = WHO-Five Well-being Index; MBSR = Mindfulness Based Stress Reduction; LSCS = Applicability of life-satisfaction-related character strengths (i.e., hope, zest, curiosity, love, and gratitude); β = Beta coefficient; Δ = change.
* $p < .05$.

According to Table 7, it seems that the mediation model did not work very well, which hints towards the idea that the effect of mindfulness training on well-being is probably not through the enhancement of character strengths (path a, and the difference of c-c' is not significant). However, specific research questions surrounding mindfulness and its training, character strengths, and well-being are still suggested to be investigated in a separate, larger sample.

Going one step further, we often assume and imply that (at least some) positive traits (such as mindfulness and character strengths) lead to well-being. What if it was the other way around, what if well-being increased our enacting of moral traits and our wish to become a virtuous person? That is, what if happiness made us more mindful and morally more engaged? Future research might think of digging deeper into those questions deeper and designing relevant studies to test them.

Moreover, both MBSR and MBSP contain a variety of modules and exercises, making it impossible to determine the specific interventions responsible for the observed changes in character strengths and the primary outcomes. There are a wide range of interventions that may have similar effects. Therefore, more basic research is needed to provide evidence on the upward spiral process, especially regarding each specific step. The synergetic effect of mindfulness and character strengths has been briefly tested in a workplace setting, future research could be done to demonstrate its relationship to the P-O fit and JD-R literature. Concretely, this could be done surrounding questions like how the application of strengths promotes the P-O fit, and work as a Job Resource, and what the underlying mechanisms are.

Implications for education

Traditionally, schools focus more on students' achievements such as the ability to pass exams, which has changed since recent years. Character-building is becoming an increasingly important issue for both schools and parents. Martin Luther King Jr. once said, "Intelligence plus character – that is the goal of true education." The idea to integrate mindfulness and character strengths into the curriculum could potentially make this vision a reality. As we have shown, mindfulness facilitates the enhancement of character strengths. Therefore, including mindfulness in the character education curriculum could serve as an alternative or supplementary method to foster character strengths in schools.

A number of recent attempts have been made to implement meditations in schools or universities (e.g., Brown University has included meditation "labs" as part of the curriculum; Gravois, 2005). These attempts provide benefits that go beyond stress reduction, but also enhancing engagement and understanding of subject matter as well as specific skills such as concentration, attention, and open-mindedness (Shapiro, Brown, & Astin, 2008). By additionally combining mindfulness with character strengths, extraordinary benefits in terms of both student well-being and academic performance are to be expected because of the upward spiral process.

Implications for employees as well as organizations

The results might be of relevance for employees because choosing a career is one of the major decisions that everyone takes in life. It is suggested that when searching for a job, employees could first be mindful to discover/identify their signature strengths; then they could try to attentively find an environment that allows them to use their signature strengths, creating a P-O fit from the start. However, if the environment does not fit at the first place, the employees might think of utilizing mindfulness as a Job Recourse to build upon, either using mindfulness as a way to cultivate certain strengths that would fit the environment or by being mindful in the use of their existing strengths in different ways that would create the P-O fit.

The findings also have several important practical implications for organizations. First of all, instead of waiting for the employees to find a fitting environment, the organizations could offer an environment that allows a P-O fit at the first place, which include organizing personal development program such as mindfulness and character strengths trainings, independently or jointly. Part III of the thesis showed the importance of continued engagement in explaining the continued effect of an intervention. Therefore, the organizations might consider facilitating their employees' training experiences with training websites and audio tapes, as well as regularly sending out newsletters. Yet, one should also be cautious when introducing mindfulness and well-being trainings into the current workplace because they could also result in negative consequences. It might offer the employers the opportunity to continue their bad or even inhuman working conditions but utilizing these programs to *stabilize* the psyches of employees. For example, some jobs in some textile or electronic factories in Asian countries, the so-called "Bullshit jobs", bear no meanings for the employee. In this case, instead of using the mindfulness and well-being training, improving the working conditions is of more importance.

REFERENCES

Aikens, K. A., Astin, J., Pelletier, K. R., Levanovich, K., Baase, C. M., Park, Y. Y., & Bodnar, C. M. (2014). Mindfulness goes to work: Impact of an online workplace intervention. *Journal of Occupational and Environmental Medicine*, *56*, 721. https://doi.org/10.1097/JOM.0000000000000209

Andrewes, H. E., Walker, V., & O'Neill, B. (2014). Exploring the use of positive psychology interventions in brain injury survivors with challenging behavior. *Brain Injury, 28*, 965-971. https://doi.org/10.3109/02699052.2014.888764

American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of mental disorders, fifth edition (DSM-5®)*. Arlington, VA: American Psychiatric Association.

Baccarani, C., Mascherpa, V., & Minozzo, M. (2013). Zen and well-being at the workplace. *The TQM Journal*, *25*, 606–624. https://doi.org/10.1108/TQM-07-2013-0077

Baer, R. A., & Lykins, E. L. B. (2011). Mindfulness and positive psychological Functioning. In K. M. Sheldon, T. B. Kashdan, & M. F. Steger (Eds.), *Designing positive psychology: Taking stock and moving forward* (pp. 335–348). New York, NY: Oxford University Press.

Baer, R. A., Smith, G. T., & Allen, K. B. (2004). Assessment of mindfulness by self-report: the Kentucky inventory of mindfulness skills. *Assessment*, *11*, 191–206. https://doi.org/10.1177/1073191104268029

Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment*, *13*, 27–45. https://doi.org/10.1177/1073191105283504

Bakker, A. B., & Demerouti, E. (2007). The Job Demands-Resources model: State of the art. *Journal of Managerial Psychology*, *22*, 309–328. https://doi.org/10.1108/02683940710733115

Bergomi, C., Tschacher, W., & Kupper, Z. (2013). Measuring mindfulness: First steps towards the development of a comprehensive mindfulness scale. *Mindfulness*, *4*, 18–32. https://doi.org/10.1007/s12671-012-0102-9

Bergomi, C., Tschacher, W., & Kupper, Z. (2014). Konstruktion und erste Validierung eines Fragebogens zur umfassenden Erfassung von Achtsamkeit. *Diagnostica*, *60*, 111–125. https://doi.org/10.1026/0012-1924/a000109

Birnie, K., Speca, M., & Carlson, L. E. (2010). Exploring self-compassion and empathy in the context of mindfulness-based stress reduction (MBSR). *Stress and Health*, *26*, 359–371. https://doi.org/10.1002/smi.1305

Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., … Devins, G. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice*, *11*, 230–241. https://doi.org/10.1093/clipsy.bph077

Bodhi, B. (2011). What does mindfulness really mean? A canonical perspective. *Contemporary Buddhism*, *12*, 19–39. https://doi.org/10.1080/14639947.2011.564813

Bowen, S., & Marlatt, A. (2009). Surfing the urge: Brief mindfulness-based intervention for college student smokers. *Psychology of Addictive Behaviors*, *23*, 666–671. https://doi.org/10.1037/a0017127

Bowlin, S. L., & Baer, R. A. (2012). Relationships between mindfulness, self-control, and psychological functioning. *Personality and Individual Differences*, *52*, 411–415. https://doi.org/10.1016/j.paid.2011.10.050

Brahm, A. (2006). *Mindfulness, bliss, and beyond: A meditator's handbook*. Boston, MA: Wisdom Publications.

Brdar, I., & Kashdan, T. B. (2010). Character strengths and well-being in Croatia: An empirical investigation of structure and correlates. *Journal of Research in Personality*, *44*, 151–154. https://doi.org/10.1016/j.jrp.2009.12.001

Brown, K. W., & Cordon, S. (2009). Toward a Phenomenology of Mindfulness: Subjective Experience and Emotional Correlates. In F. Didonna (Ed.), *Clinical Handbook of Mindfulness* (pp. 59–81). New York, NY: Springer New York. https://doi.org/10.1007/978-0-387-09593-6_5

Brown, K. W., & Kasser, T. (2005). Are Psychological and Ecological Well-being Compatible? The Role of Values, Mindfulness, and Lifestyle. *Social Indicators Research*, *74*, 349–368. https://doi.org/10.1007/s11205-004-8207-8

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology*, *84*, 822–848. https://doi.org/10.1037/0022-3514.84.4.822

Brown, K. W., Ryan, R. M., & Creswell, J. D. (2007). Mindfulness: Theoretical foundations and evidence for its salutary effects. *Psychological Inquiry*, *18*, 211–237. https://doi.org/10.1080/10478400701598298

Bruna, M. O., Brabete, A. C., & Izquierdo, J. M. A. (2018). Reliability generalization as a seal of quality of substantive meta-analyses: The case of the VIA inventory of strengths (VIA-IS) and their relationships to life satisfaction. *Psychological Reports*, 0033294118779198. https://doi.org/10.1177/0033294118779198

Burns, A. B., Brown, J. S., Sachs-Ericsson, N., Ashby Plant, E., Thomas Curtis, J., Fredrickson, B. L., & Joiner, T. E. (2008). Upward spirals of positive emotion and coping: Replication, extension, and initial exploration of neurochemical substrates. *Personality and Individual Differences*, *44*, 360–370. https://doi.org/10.1016/j.paid.2007.08.015

Buschor, C., Proyer, R. T., & Ruch, W. (2013). Self- and peer-rated character strengths: How do they relate to satisfaction with life and orientations to happiness? *The Journal of Positive Psychology*, *8*, 116–127. https://doi.org/10.1080/17439760.2012.758305

Cable, D. M., & DeRue, D. S. (2002). The convergent and discriminant validity of subjective fit perceptions. *Journal of Applied Psychology*, *87*, 875–884. https://doi.org/10.1037/0021-9010.87.5.875

Cardaciotto, L., Herbert, J. D., Forman, E. M., Moitra, E., & Farrow, V. (2008). The assessment of present-moment awareness and acceptance: The Philadelphia mindfulness scale. *Assessment*, *15*, 204–223. https://doi.org/10.1177/1073191107311467

Carmody, J., Reed, G., Kristeller, J., & Merriam, P. (2008). Mindfulness, spirituality, and health-related symptoms. *Journal of Psychosomatic Research*, *64*, 393–403. https://doi.org/10.1016/j.jpsychores.2007.06.015

Carson, J. W., Carson, K. M., Gil, K. M., & Baucom, D. H. (2004). Mindfulness-based relationship enhancement. *Behavior Therapy*, *35*, 471–494. https://doi.org/10.1016/S0005-7894(04)80028-5

Castro Solano, A., & Cosentino, A. C. (2016). The relationships between character strengths and life fulfillment in the view of lay-people in Argentina. *Interdisciplinaria Revista de Psicología y Ciencias Afines, 33*, 65-80.

Chadwick, P., Hember, M., Symes, J., Peters, E., Kuipers, E., & Dagnan, D. (2008). Responding mindfully to unpleasant thoughts and images: Reliability and validity of the Southampton mindfulness questionnaire (SMQ). *British Journal of Clinical Psychology*, *47*, 451–455. https://doi.org/10.1348/014466508X314891

Choi, S. W., Kim, D. J., Choi, J. S., Ahn, H., Choi, E. J., Song, W. Y., Kim, S., & Youn, H. C. (2015). Comparison of risk and protective factors associated with smartphone addiction and Internet addiction. *Journal of Behavioral Addictions, 4*, 308-314. http://dx.doi.org/10.1556/2006.4.2015.043

Crowne, D. P., & Marlowe, D. (1960). A new scale of social desirability independent of psychopathology. *Journal of Consulting Psychology*, *24*, 349–354. https://doi.org/10.1037/h0047358

Dahlsgaard, K., Peterson, C., & Seligman, M. E. P. (2005). Shared virtue: The convergence of valued human strengths across culture and history. *Review of General Psychology*, *9*, 203–213. https://doi.org/10.1037/1089-2680.9.3.203

Desbordes, G. (2016). On the relationship between mindfulness and Buddhism (hint: It's complicated). *PsycCRITIQUES, 61*. doi:org/10.1037/a0040339

Dubreuil, P., Forest, J., & Courcy, F. (2014). From strengths use to work performance: The role of harmonious passion, subjective vitality, and concentration. *The Journal of Positive Psychology*, *9*, 335–349. https://doi.org/10.1080/17439760.2014.898318

Dykens, E. M. (2006). Toward a positive psychology of mental retardation. *American Journal of Orthopsychiatry, 76*, 185-193. https://doi.org/10.1037/0002-9432.76.2.185

Eberth, J., & Sedlmeier, P. (2012). The Effects of Mindfulness Meditation: A Meta-Analysis. *Mindfulness*, *3*, 174–189. https://doi.org/10.1007/s12671-012-0101-x

Emmons, R. A., & McCullough, M. E. (2003). Counting blessings versus burdens: An experimental investigation of gratitude and subjective well-being in daily life. *Journal of Personality and Social Psychology*, *84*, 377–389.

Evans, D. R., Baer, R. A., & Segerstrom, S. C. (2009). The effects of mindfulness and self-consciousness on persistence. *Personality and Individual Differences*, *47*, 379–382. https://doi.org/10.1016/j.paid.2009.03.026

Farmer, J. L., Allsopp, D. H., Ferron, J. M. (2015). Impact of the personal strengths program on self-determination levels of college students with LD and/or ADHD. *Learning Disability Quarterly, 38*, 145-159. https://doi.org/10.1177/0731948714526998

Feldman, G., Hayes, A., Kumar, S., Greeson, J., & Laurenceau, J.-P. (2006). Mindfulness and emotion regulation: The development and initial validation of the cognitive and

affective mindfulness scale-revised (CAMS-R). *Journal of Psychopathology and Behavioral Assessment*, *29*, 177. https://doi.org/10.1007/s10862-006-9035-8

Fredrickson, B. L., Tugade, M. M., Waugh, C. E., & Larkin, G. R. (2003). What good are positive emotions in crises? A prospective study of resilience and emotions following the terrorist attacks on the United States on September 11th, 2001. *Journal of Personality and Social Psychology*, *84*, 365–376.

Gander, F., Hofmann, J., Proyer, R., & Ruch, W. (in press). Character strengths – stability, change, and relationships with well-being changes. *Applied Research in Quality of Life, Special Issue "Character strengths, well-being, and health in educational and vocational settings*".

Gander, F., Proyer, R. T., Ruch, W., & Wyss, T. (2013). Strength-based positive interventions: Further evidence for their potential in enhancing well-being and alleviating depression. *Journal of Happiness Studies, 14*, 1241-1259. https://doi.org/10.1007/s10902-012-9380-0

Garland, E. L., Farb, N. A., Goldin, P. R., & Fredrickson, B. L. (2015). Mindfulness broadens awareness and builds eudaimonic meaning: A process model of mindful positive emotion regulation. *Psychological Inquiry*, *26*, 293–314. https://doi.org/10.1080/1047840X.2015.1064294

Garland, E. L., Gaylord, S. A., & Fredrickson, B. L. (2011). Positive reappraisal mediates the stress-reductive effects of mindfulness: An upward spiral process. *Mindfulness*, *2*, 59–67. https://doi.org/10.1007/s12671-011-0043-8

Garland, S. N., Carlson, L. E., Cook, S., Lansdell, L., & Speca, M. (2007). A non-randomized comparison of mindfulness-based stress reduction and healing arts programs for facilitating post-traumatic growth and spirituality in cancer outpatients. *Supportive Care in Cancer*, *15*, 949–961. https://doi.org/10.1007/s00520-007-0280-5

Gethin, R. (1998). Foundations of Buddhism. New York, NY: Oxford University Press.

Ghielen, S. T. S., Woerkom, M. van, & Meyers, M. C. (2018). Promoting positive outcomes through strengths interventions: A literature review. *The Journal of Positive Psychology*, *13*, 573–585. https://doi.org/10.1080/17439760.2017.1365164

Gilman, R., Dooley, J., & Florell, D. (2006). Relative levels of hope and their relationship with academic and psychological indicators among adolescents. *Journal of Social and Clinical Psychology*, *25*, 166–178. https://doi.org/10.1521/jscp.2006.25.2.166

Giolzetti, A. C. (2012). *An examination of the relationship between mindfulness and love* (Doctoral dissertation). Massachusetts School of Professional Psychology, Newton, MA. Retrieved from https://search.proquest.com/docview/1113339859/abstract/572D3374439840EAPQ/1

Glomb, T. M., Yang, T., Bono, J. E., & Duffy, M. K. (2011). Mindfulness at work. In *Research in Personnel and Human Resources Management* (Vol. 30, pp. 115–157). Emerald Group Publishing Limited. https://doi.org/10.1108/S0742-7301(2011)0000030005

Gravois, J. (2005, October 21). Meditate on it. *The Chronicle of Higher Education*, A10–A12.

Grossman, P. (2011). Defining mindfulness by how poorly I think I pay attention during everyday awareness and other intractable problems for psychology's (re)invention of mindfulness: Comment on Brown et al. (2011). *Psychological Assessment*, *23*, 1034–1040. https://doi.org/10.1037/a0022713

Grossman, P., & Van Dam, N. T. (2011). Mindfulness, by any other name…: trials and tribulations of sati in western psychology and science. *Contemporary Buddhism*, *12*, 219–239. https://doi.org/10.1080/14639947.2011.564841

Haimerl, C. J., & Valentine, E. R. (2001). The effect of contemplative practice on intrapersonal, interpersonal, and transpersonal dimensions of the self-concept. *Journal of Transpersonal Psychology*, *33*, 37–52.

Hanh, T. N. (1999). *The heart of the Buddha's teaching*. Portland, OR: Broadway Books.

Hanks, R. A., Rapport, L. J., Waldron-Perrine, B., & Millis, S. R. (2014). Role of character strengths in outcome after mild complicated to severe traumatic brain injury: A positive psychology study. *Archives of Physical Medicine and Rehabilitation*, *95*, 2096–2102. https://doi.org/10.1016/j.apmr.2014.06.017

Harzer, C., Mubashar, T., & Dubreuil, P. (2017). Character strengths and strength-related person-job fit as predictors of work-related well-being, job performance, and workplace deviance. *Wirtschaftspsychologie, 19*, 23–38.

Harzer, C., & Ruch, W. (2012). When the job is a calling: The role of applying one's signature strengths at work. *The Journal of Positive Psychology*, *7*, 362–371. https://doi.org/10.1080/17439760.2012.702784

Harzer, C., & Ruch, W. (2013). The application of signature character strengths and positive experiences at work. *Journal of Happiness Studies*, *14*, 965–983. https://doi.org/10.1007/s10902-012-9364-0

Harzer, C., & Ruch, W. (2015). The relationships of character strengths with coping, work-related stress, and job satisfaction. *Frontiers in Psychology*, *6*. https://doi.org/10.3389/fpsyg.2015.00165

Hausler, M., Strecker, C., Huber, A., Brenner, M., Höge, T., & Höfer, S. (2017). Associations between the application of signature character strengths, health and well-being of health professionals. *Frontiers in Psychology*, *8*. https://doi.org/10.3389/fpsyg.2017.01307

Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (1999). *Acceptance and commitment therapy: An experiential approach to behavior change*. New York, NY: Guilford Press.

Hernandez, X. (2009). *Character strengths and social axioms for Caucasian and Mexican-American managers and non -managers* (Doctoral dissertation). Alliant International University, San Diego, CA. Retrieved from https://search.proquest.com/docview/305168995/abstract/4336C9C750904C46PQ/1

Hockenbury, S. E., Nolan, S., & Hockenbury, P. (2016). *Discovering psychology*. New York, NY: Macmillan Learning.

Huffman, J. C., Mastromauro, C. A., Boehm, J. K., Seabrook, R., Fricchione, G. L., Denninger, J. W., et al. (2011). Development of a positive psychology intervention for patients with acute cardiovascular disease. *Heart International, 6*, e14. https://doi.org/10.4081/hi.2011.e13a

Huffman, J.C., Millstein, R.A., Mastromauro, C.A., Shannon V. Moore, Christopher M. Celano, C. Andres Bedoya, Laura Suarez, Julia K. Boehm, James L. Januzzi. (2016). A positive psychology intervention for patients with an acute coronary syndrome: Treatment development and proof-of-concept trial. *Journal of Happiness Studies, 17*, 1985-2006. https://doi.org/10.1007/s10902-015-9681-1

Huta, V., & Hawley, L. (2010). Psychological strengths and cognitive vulnerabilities: Are they two ends of the same continuum or do they have independent relationships with well-being and ill-being? *Journal of Happiness Studies, 11*, 71–93. https://doi.org/10.1007/s10902-008-9123-4

Hülsheger, U. R., Alberts, H. J. E. M., Feinholdt, A., & Lang, J. W. B. (2013). Benefits of mindfulness at work: The role of mindfulness in emotion regulation, emotional exhaustion, and job satisfaction. *Journal of Applied Psychology*, *98*, 310–325. https://doi.org/10.1037/a0031313

Ivtzan, I., Gardner, H. E., & Smailova, Z. (2011). Mindfulness meditation and curiosity: The contributing factors to wellbeing and the process of closing the self-discrepancy gap. *International Journal of Wellbeing*, *1*, 316–321. https://doi.org/10.5502/ijw.v1i3.2

Kabat-Zinn, J. (1982). An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: Theoretical considerations and preliminary results. *General Hospital Psychiatry*, *4*, 33–47. https://doi.org/10.1016/0163-8343(82)90026-3

Kashdan, T., & Biswas-Diener, R. (2014). *The upside of your dark side: Why being your whole self – not just your" good" self – drives success and fulfillment*. New York, Penguin Group.

Keng, S.-L., Smoski, M. J., & Robins, C. J. (2011). Effects of mindfulness on psychological health: A review of empirical studies. *Clinical Psychology Review*, *31*, 1041–1056. https://doi.org/10.1016/j.cpr.2011.04.006

Kenny, M. A., & Williams, J. M. G. (2007). Treatment-resistant depressed patients show a good response to Mindfulness-based Cognitive Therapy. *Behaviour Research and Therapy*, *45*, 617–625. https://doi.org/10.1016/j.brat.2006.04.008

Kirchner, J., Ruch, W., & Dziobek, I. (2016). Brief report: Character strengths in adults with autism spectrum disorder without intellectual impairment. *Journal of Autism and Developmental Disorders, 46*, 3330-3337. https://doi.org/10.1007/s10803-016-2865-7

Klatt, M. D., Buckworth, J., & Malarkey, W. B. (2009). Effects of low-dose mindfulness-based stress reduction (MBSR-ld) on working adults. *Health Education & Behavior: The Official Publication of the Society for Public Health Education*, *36*, 601–614. https://doi.org/10.1177/1090198108317627

Koszycki, D., Benger, M., Shlik, J., & Bradwejn, J. (2007). Randomized trial of a meditation-based stress reduction program and cognitive behavior therapy in generalized social anxiety disorder. *Behaviour Research and Therapy*, *45*, 2518–2526. https://doi.org/10.1016/j.brat.2007.04.011

Kristeller, J., Wolever, R. Q., & Sheets, V. (2014). Mindfulness-Based Eating Awareness Training (MB-EAT) for binge eating: A randomized clinical trial. *Mindfulness*, *5*, 282–297. https://doi.org/10.1007/s12671-012-0179-1

Kristof, A. L. (1996). Person-organization fit: An integrative review of its conceptualizations, measurement, and implications. *Personnel Psychology*, *49*(1), 1–49. https://doi.org/10.1111/j.1744-6570.1996.tb01790.x

Kristof-Brown, A. L., Zimmerman, R. D., & Johnson, E. C. (2005). Consequences of individuals' fit at work: A meta-analysis of person-job, person-organization, person-group, and person-supervisor fit. *Personnel Psychology*, *58*, 281–342. https://doi.org/10.1111/j.1744-6570.2005.00672.x

Lanestrand, L. (2012). Creating the conditions for growth and learning: Mindfulness as a contribution to sustainable learning. *Social Alternatives*, *31*, 58-61.

Lau, M. A., Bishop, S. R., Segal, Z. V., Buis, T., Anderson, N. D., Carlson, L., … Devins, G. (2006). The Toronto mindfulness scale: Development and validation. *Journal of Clinical Psychology*, *62*, 1445–1467. https://doi.org/10.1002/jclp.20326

Lebuda, I., Zabelina, D. L., & Karwowski, M. (2016). Mind full of ideas: A meta-analysis of the mindfulness–creativity link. *Personality and Individual Differences*, *93*, 22–26. https://doi.org/10.1016/j.paid.2015.09.040

Ledesma, D., & Kumano, H. (2009). Mindfulness-based stress reduction and cancer: a meta-analysis. *Psycho-Oncology*, *18*, 571–579. https://doi.org/10.1002/pon.1400

Leventhal, K. S., DeMaria, L. M., Gillham, J. E., Andrew, G., Peabody, J., & Leventhal, S. M. (2016). A psychosocial resilience curriculum provides the "missing piece" to boost adolescent physical health: A randomized controlled trial of Girls First in India. *Social Science & Medicine, 161*, 37–46. http://doi.org/10.1016/j.socscimed.2016.05.004

Leventhal, K. S., Gillham, J., DeMaria, L., Andrew, G., Peabody, J., & Leventhal, S. (2015). Building psychosocial assets and wellbeing among adolescent girls: A randomized controlled trial. *Journal of Adolescence, 45*, 284–295. http://doi.org/10.1016/j.adolescence.2015.09.011

Littman-Ovadia, H., & Steger, M. (2010). Character strengths and well-being among volunteers and employees: Toward an integrative model. *The Journal of Positive Psychology*, *5*, 419–430. https://doi.org/10.1080/17439760.2010.516765

Logan, D. E., Kilmer, J. R., & Marlatt, G. A. (2010). The virtuous drinker: Character virtues as correlates and moderators of college student drinking and consequences. *Journal of American College Health, 58*, 317–324. https://doi.org/10.1080/07448480903380326

Lounsbury, J. W., Fisher, L. A., Levy, J. J., & Welsh, D. P. (2009). An investigation of character strengths in relation to the academic success of college students. *Individual Differences Research*, *7*, 52–69.

Lutz, A., Greischar, L. L., Rawlings, N. B., Ricard, M., & Davidson, R. J. (2004). Long-term meditators self-induce high-amplitude gamma synchrony during mental practice. *Proceedings of the National Academy of Sciences*, *101*, 16369–16373. https://doi.org/10.1073/pnas.0407401101

Marlatt, G. A., & Kristeller, J. L. (1999). Mindfulness and meditation. In *Integrating spirituality into treatment: Resources for practitioners* (pp. 67–84). Washington, DC, US: American Psychological Association. https://doi.org/10.1037/10327-004

Martinez-Marti, M. L., & Ruch, W. (2014). Character strengths and well-being across the life span: data from a representative sample of German-speaking adults living in Switzerland. *Frontiers in Psychology, 5*, 1253. http://doi.org/10.3389/fpsyg.2014.01253

Martínez-Martí, M. L., & Ruch, W. (2017). Character strengths predict resilience over and above positive affect, self-efficacy, optimism, social support, self-esteem, and life satisfaction. *The Journal of Positive Psychology*, *12*, 110–119. https://doi.org/10.1080/17439760.2016.1163403

Maslow, A.H. (1954) Motivation and Personality. New York, NY: Harper & Row.

Mayerson, N. (2015, August 18). "Characterizing" the workplace: Using character strengths to create sustained success. Retrieved October 15, 2018, from http://www.viacharacter.org/blog/characterizing-workplace-using-character-strengths-create-sustained-success/

Meyers, M. C., & van Woerkom, M. (2017). Effects of a strengths intervention on general and work-related well-being: The mediating role of positive affect. *Journal of Happiness Studies*, *18*, 671–689. https://doi.org/10.1007/s10902-016-9745-x

Mitchell, J. T., Zylowska, L., & Kollins, S. H. (2015). Mindfulness meditation training for attention-deficit/hyperactivity disorder in adulthood: Current empirical support, treatment overview, and future directions. *Cognitive and Behavioral Practice*, *22*, 172–191. https://doi.org/10.1016/j.cbpra.2014.10.002

Munoz, R. T., Hoppes, S., Hellman, C. M., Brunk, K. L., Bragg, J. E., & Cummins, C. (2018). The effects of mindfulness meditation on hope and stress. *Research on Social Work Practice*, *28*, 696–707. https://doi.org/10.1177/1049731516674319

Niemiec, R. M. (2014). *Mindfulness and character strengths: : A practical guide to flourishing.* Boston, MA: Hogrefe Publishing.

Niemiec, R. M., & Lissing, J. (2016). Mindfulness-based strengths practice (MBSP) for enhancing well-being, managing problems, and boosting positive relationships. In I. Ivtzan, T. Lomas (Eds.), *Mindfulness in positive psychology: The science of meditation and wellbeing* (pp. 15-36). London, UK: Routledge

Neff, K., & Davidson, O. (2016). Self-compassion: Embracing suffering with kindness. In *Mindfulness in Positive Psychology* (pp. 47–60). New York, NY: Routledge.

Park, N., & Peterson, C. (2003). *Values in Action Inventory of Strengths for Youth (VIA-Youth)*. Cincinnati, OH: Values in Action Institute.

Park, N., & Peterson, C. (2007). Methodological issues in positive psychology and the assessment of character strengths. In A. D. Ong & M. van Dulmen (Eds.), *Oxford Handbook of methods in positive psychology* (pp. 292–305). New York, NY: Oxford University Press.

Park, N., & Peterson, C. (2008). Positive psychology and character strengths: Application to strengths-based school counseling. *Professional School Counseling*, *12*, 85–92.

Park, N., & Peterson, C. (2009). Character Strengths: Research and practice. *Journal of College and Character*, *10*, null. https://doi.org/10.2202/1940-1639.1042

Peterson, C, Park, N., & Seligman, M. E. P. (2005). Assessment of character strengths. In G. P. Koocher, J. C. Norcross, & S. S. Hill III (Eds.), *Psychologists' desk reference* (2nd ed., pp. 93–98). New York, NY: Oxford University Press.

Peterson, C. (2005). *Brief Strengths Test – BST*. Michigan, MI: University of Michigan.

Peterson, C. (2006). *A primer in positive psychology* (1st edition). New York, NY: Oxford University Press.

Peterson, C, & Park, N. (2003). Positive psychology as the evenhanded positive psychologist views it. *Psychological Inquiry*, *14*, 143–147.

Peterson, C, & Park, N. (2004). Classification and measurement of character strengths: Implications for practice. In *Positive Psychology in Practice* (pp. 433–446). Wiley-Blackwell. https://doi.org/10.1002/9780470939338.ch27

Peterson, C, Park, N., & Seligman, M. E. P. (2006). Greater strengths of character and recovery from illness. *The Journal of Positive Psychology*, *1*, 17–26. https://doi.org/10.1080/17439760500372739

Peterson, C, & Seligman, M. E. P. (2004). *Character strengths and virtues: A handbook and classification*. New York, NY: Oxford University Press.

Petkari, E., & Ortiz-Tallo, M. (2016). Towards youth happiness and mental health in the United Arab Emirates: The path of character strengths in a multicultural population. *Journal of Happiness Studies, 19*, 333-350. http://dx.doi.org/10.1007/s10902-016-9820-3

Proyer, R. T., Gander, F., Wellenzohn, S., & Ruch, W. (2013). What good are character strengths beyond subjective well-being? The contribution of the good character on self-reported health-oriented behavior, physical fitness, and the subjective health

status. *The Journal of Positive Psychology*, *8*, 222–232. https://doi.org/10.1080/17439760.2013.777767

Proyer, R. T., Wellenzohn, S., & Ruch, W. (2014). Character and dealing with laughter: The relation of self- and peer-reported strengths of character with gelotophobia, gelotophilia, and katagelasticism. *Journal of Psychology: Interdisciplinary and Applied, 148*, 113-132. http://dx.doi.org/10.1080/00223980.2012.752336

Rashid, T. (2014). Positive psychotherapy: A strength-based approach. *Journal of Positive Psychology, 10*, 25-40. https://doi.org/10.1080/17439760.2014.920411

Rashid, T., & Anjum. A (2007). Positive psychotherapy for children and adolescents. In J. R. Z. Abela & B. L. Hankin (Eds.), *Depression in children and adolescents: Causes, treatment and prevention* (pp. 250–287). New York, NY: Guilford Press.

Reb, J., Narayanan, J., & Chaturvedi, S. (2014). Leading mindfully: Two studies on the influence of supervisor trait mindfulness on employee well-being and performance. *Mindfulness*, *5*, 36–45. https://doi.org/10.1007/s12671-012-0144-z

Rosenzweig, D. (2013). The sisters of mindfulness. *Journal of Clinical Psychology*, *69*, 793–804. https://doi.org/10.1002/jclp.22015

Ruch, W. (2008). Positive Psychologie und das Values in Action Inventory of Strengths (VIA-IS). In D. Jungo, R. Ziehlmann, & W. Ruch (Eds.). *Das VIA-IS in der Laufbahnberatung* (pp. 9-23). Bern, Switzerland: SDBB Verlag.

Ruch, W., Huber, A., Beermann, U., & Proyer, R. T. (2007). Character strengths as predictors of the "good life" in Austria, Germany and Switzerland. In Romanian Academy, "George Barit" Institute of History, Department of Social Research (Ed.), *Studies and researches in social sciences* (Vol. 16, pp. 123–131). Cluj-Napoca, Romania: Argonaut Press. https://doi.org/info:doi/10.5167/uzh-3648

Ruch, W., Martínez-Martí, M. L., Proyer, R. T., & Harzer, C. (2014). The Character Strengths Rating Form (CSRF): Development and initial assessment of a 24-item rating scale to

assess character strengths. *Personality and Individual Differences*, *68*, 53–58. https://doi.org/10.1016/j.paid.2014.03.042

Ruch, W., Proyer, R. T., Harzer, C., Park, N., Peterson, C., & Seligman, M. E. P. (2010). Adaptation and validation of the German version of the Values in Action Inventory of Strengths (VIA-IS) and the development of a peer-rating form. *Journal of Individual Differences*, *31*, 138–149. https://doi.org/10.1027/1614-0001/a000022

Rust, T., Diessner, R., & Reade, L. (2009). Strengths only or strengths and relative weaknesses? A preliminary study. *The Journal of Psychology*, *143*, 465–476. https://doi.org/10.3200/JRL.143.5.465-476

Ryan, R. M., & Deci, E. L. (2001). On happiness and human potentials: A review of research on hedonic and eudaimonic well-being. *Annual Review of Psychology*, *52*, 141–166. https://doi.org/10.1146/annurev.psych.52.1.141

Rhys Davids, T. W. (1881). Buddhist suttras. Oxford, UK: Clarendon Press.

Schmidt, S., Grossman, P., Schwarzer, B., Jena, S., Naumann, J., & Walach, H. (2011). Treating fibromyalgia with mindfulness-based stress reduction: Results from a 3-armed randomized controlled trial. *PAIN®*, *152*, 361–369. https://doi.org/10.1016/j.pain.2010.10.043

Segal, Z. V., Williams, J. M. G., & Teasdale, J. D. (2013). *Mindfulness-based cognitive therapy for depression* (2nd ed.). New York, NY: Guilford Press.

Seligman, M. E. P. (2002). *Authentic happiness: Using the new positive psychology to realize your potential for lasting fulfillment*. New York, NY: Free Press.

Seligman, M. E. (2015). Chris Peterson's unfinished masterwork: The real mental illnesses. *The Journal of Positive Psychology, 10*, 3-6. https://doi.org/10.1080/17439760.2014.888582

Seligman, M. E. P., & Csikszentmihalyi, M. (2000). Positive psychology: An introduction. *American Psychologist*, *55*, 5–14. https://doi.org/10.1037/0003-066X.55.1.5

Seligman, M. E. P., Rashid, T., & Parks, A. C. (2006). Positive psychotherapy. *American Psychologist, 61*, 774–788. http://dx.doi.org/10.1037/0003-066X.61.8.774

Seligman, M. E. P., Steen, T. A., Park, N., & Peterson, C. (2005). Positive psychology progress: empirical validation of interventions. *The American Psychologist*, *60*, 410–421. https://doi.org/10.1037/0003-066X.60.5.410

Shao, R., & Skarlicki, D. P. (2009). The role of mindfulness in predicting individual performance. *Canadian Journal of Behavioural Science*, *41*, 195–201. https://doi.org/10.1037/a0015166

Shapiro, S. L., Brown, K. W., & Astin, J. A. (2008). *Toward the integration of meditation into higher education: A review research*. The Center for Contemplative Mind in Society. Retrieved from http://www. contemplativemind. org/admin/wp-content/uploads/2012/09/MedandHigherEd. pdf.

Shapiro, S. L., & Carlson, L. E. (2017). *The art and science of mindfulness: Integrating mindfulness into psychology and the helping professions, 2nd ed*. Washington, DC, US: American Psychological Association. https://doi.org/10.1037/0000022-000

Shapiro, S. L., Carlson, L. E., Astin, J. A., & Freedman, B. (2006). Mechanisms of mindfulness. *Journal of Clinical Psychology*, *62*, 373–386. https://doi.org/10.1002/jclp.20237

Shapiro, S., Sousa, S. de, & Jazaieri, and H. (2016). Mindfulness, mental health, and positive psychology. In I. Ivtzan & T. Lomas (Eds.), *Mindfulness in positive psychology* (pp. 108–125). https://doi.org/10.4324/9781315747217-14

Shimai, S., Otake, K., Park, N., Peterson, C., & Seligman, M. E. P. (2006). Convergence of character strengths in American and Japanese young adults. *Journal of Happiness Studies*, *7*, 311. https://doi.org/10.1007/s10902-005-3647-7

Shonin, E., Van Gordon, W., & Singh, N. N. (2015). *Buddhist Foundations of Mindfulness*. Cham, Switzerland: Springer International Publishing.

Stairs, M., & Galpin, M. (2010). Positive engagement: From employee engagement to workplace happiness. In P. A. Linley, S. Harrington, & N. Garcea (Eds.), *Oxford handbook of positive psychology and work* (pp. 155–172). New York, NY: Oxford University Press.

Stander, F. W., Mostert, K., & Beer, L. T. de. (2014). Organisational and individual strengths use as predictors of engagement and productivity. *Journal of Psychology in Africa*, *24*, 403–409. https://doi.org/10.1080/14330237.2014.997007

Tanay, G., & Bernstein, A. (2013). State Mindfulness Scale (SMS): Development and initial validation. *Psychological Assessment*, *25*, 1286–1299. https://doi.org/10.1037/a0034044

Teasdale, J. D., & Chaskalson, M. (2011b). How does mindfulness transform suffering? I: the nature and origins of dukkha. *Contemporary Buddhism*, *12*, 89–102. https://doi.org/10.1080/14639947.2011.564824

Vaish, A., Grossmann, T., & Woodward, A. (2008). Not all emotions are created equal: The negativity bias in social-emotional development. *Psychological Bulletin*, *134*, 383–403. https://doi.org/10.1037/0033-2909.134.3.383

Van Gordon, W., Shonin, E., Griffiths, M. D., & Singh, N. N. (2015). Mindfulness and the Four Noble Truths. In E. Shonin, W. Van Gordon, & N. N. Singh (Eds.), *Buddhist Foundations of Mindfulness* (pp. 9–27). Cham, Switzerland: Springer International Publishing. https://doi.org/10.1007/978-3-319-18591-0_2

van Woerkom, M., Bakker, A. B., & Nishii, L. H. (2016). Accumulative job demands and support for strength use: Fine-tuning the job demands-resources model using conservation of resources theory. *Journal of Applied Psychology*, *101*, 141–150. https://doi.org/10.1037/apl0000033

van Woerkom, M., & Meyers, M. C. (2015). My strengths count! Effects of a strengths-based psychological climate on positive affect and job performance. *Human Resource Management*, *54*, 81–103. https://doi.org/10.1002/hrm.21623

van Woerkom, M., Oerlemans, W., & Bakker, A. B. (2016). Strengths use and work engagement: a weekly diary study. *European Journal of Work and Organizational Psychology*, *25*, 384–397. https://doi.org/10.1080/1359432X.2015.1089862

Vertilo, V., & Gibson, J. M. (2014). Influence of character strengths on mental health stigma. *Journal of Positive Psychology, 9*, 266-275. https://doi.org/10.1080/17439760.2014.891245

Wagner, L., & Ruch, W. (2015). Good character at school: Positive classroom behavior mediates the link between character strengths and school achievement. *Frontiers in Psychology 6,* 610. https://doi.org/10.3389/fpsyg.2015.00610

Walach, H., Buchheld, N., Buttenmüller, V., Kleinknecht, N., & Schmidt, S. (2006). Measuring mindfulness – the Freiburg Mindfulness Inventory (FMI). *Personality and Individual Differences*, *40*, 1543–1555. https://doi.org/10.1016/j.paid.2005.11.025

Walsh, R. (1983). Meditation practice and research. *Journal of Humanistic Psychology*, *23*, 18–50. https://doi.org/10.1177/0022167883231004

Walsh, Z. (2015). Buddhism and positive psychology. In D. A. Leeming (Ed.), *Encyclopedia of Psychology and Religion* (pp. 1–3). Berlin, Germany: Springer. https://doi.org/10.1007/978-3-642-27771-9

Weber, M., & Ruch, W. (2012). The role of character strengths in adolescent romantic relationships: An initial study on partner selection and mates' life satisfaction. *Journal of Adolescence*, *35*, 1537–1546. https://doi.org/10.1016/j.adolescence.2012.06.002

Wellenzohn, S., Proyer, R. T., & Ruch, W. (2016). Humor-based online positive psychology interventions: A randomized placebo-controlled long-term trial. *Journal of Positive Psychology, 11*, 584-594. https://doi.org/10.1080/17439760.2015.1137624

Wolever, R. Q., Bobinet, K. J., McCabe, K., Mackenzie, E. R., Fekete, E., Kusnick, C. A., & Baime, M. (2012). Effective and viable mind-body stress reduction in the workplace: A randomized controlled trial. *Journal of Occupational Health Psychology*, *17*, 246–258. https://doi.org/10.1037/a0027278

Wong, S. Y.-S., Chan, F. W.-K., Wong, R. L.-P., Chu, M.-C., Kitty Lam, Y.-Y., Mercer, S. W., & Ma, S. H. (2011). Comparing the effectiveness of mindfulness-based stress reduction and multidisciplinary intervention programs for chronic pain: A randomized comparative trial. *The Clinical Journal of Pain*, *27*, 724–734. https://doi.org/10.1097/AJP.0b013e3182183c6e

Wrzesniewski, A., McCauley, C., Rozin, P., & Schwartz, B. (1997). Jobs, careers, and callings: People's relations to their work. *Journal of Research in Personality*, *31*, 21–33. https://doi.org/10.1006/jrpe.1997.2162

Zangi, H. A., & Haugli, L. (2017). Vitality training—A mindfulness- and acceptance-based intervention for chronic pain. *Patient Education and Counseling*, *100*, 2095–2097. https://doi.org/10.1016/j.pec.2017.05.032

EHRENWORT

Hiermit erkläre ich, dass die Dissertation von mir selbst ohne unerlaubte Beihilfe verfasst worden ist.

Ort und Datum	Unterschrift
Zürich, 14. Feb.2019	

CURRICULUM VITAE

Personal Information
Dandan Pang, born on January 1st, 1989, China.

Education

2015-2018 (expected)	UNIVERSITY OF ZURICH *PhD., Psychology. Advisor: Prof. Dr. Willibald Ruch.*
2011-2014	UNIVERSITY OF ZURICH *M.Sc., Psychology (Grade: 5.7/6.0).*
2007-2011	SUN YAT-SEN UNIVERSITY *B.Sc., Applied Psychology (Grade: 5.8/6.0).*

Academic Positions

2018	UNIVERSITY OF PENNSYLVANIA Visiting Researcher at the Positive Psychology Center, Advisor: Prof. Dr. Lyle Ungar
2016-current	UNIVERSITY OF ZURICH *Lecturer of Certificate of Advanced Studies (CAS) in Positive Psychology*
2014-current	UNIVERSITY OF ZURICH *Research and Teaching Associate, Section Personality and Assessment*
2012-2014	UNIVERSITY OF ZURICH *Research Assistant, Zurich Interaction and Expression Lab*

Awards

2016	Best Symposium Presentation Award, Brasov, Romania
2016-2019	PhD Scholarship, Doc.CH, Swiss National Foundation, Switzerland
2009	Outstanding Leadership Award & Best Team Award, Youth League Committee, Sun Yat-sen University, China
2007-2010	University Scholarship for Premium Students, Sun Yat-sen University, China

Research Funding

1. Social skills group intervention and loneliness among college students in China. 091055842, 2009-2010, ¥10,000. Chinese National Creative Research Program for Undergraduate Students. Role: PI.
2. Investigations and reflections on the current educational condition of the children of migrant peasant-workers in the city after the free compulsory education policy was promulgated. 2009, ¥1500, Youth League Committee, Sun Yat-sen University. Role: PI.
3. The mutual support model of mindfulness and character strengths and a new perspective on emotion regulation of mindfulness. 165465, 2016-2019, £180,768. Swiss National Science Foundation. Role: PI.
4. Toward character strengths from language exploration in social media. 165465/2, 2018, £14,000. Swiss National Science Foundation. Role: PI.

Teaching

2014-2018	University of Zurich: Research colloquium (seminar, graduate level)
2017 Spring	University of Zurich: Selected topics in personality research (seminar, undergraduate level)

2016 Spring & Autumn	University of Zurich: Positive traits: Intellectual and moral excellence (seminar, undergraduate level)

Invited Guest Lectures

2017	University of Zurich: Psychological Assessment (Lecture, graduate level)
2015/2016 Autumn	University of Zurich: Fundamental and applied fields of personality psychology (seminar, graduate level)
2016	University of Zurich: Certificate of advanced studies (CAS) in positive psychology (workshop, post-graduate level)
2016	University of Zurich: Character strengths: The good life and positive psychology (seminar, graduate level)

Advising

Internship**:** Nathelie Golec, Anna Negovetic, Ian Grant, Valerie Wiedemann, Rian Doris, Lennart Koch
Bachelor thesis: Stefan Isler, Lyle Toelle, Lennart Koch
Master thesis: Luisa Niethammer, Valentina Vylobkova, Ian Grant, Valerie Wiedemann
Certificate of Advanced Studies in Positive Psychology: Noemi Marti, Raoul Mutter, Rukiye Isik, Irina Schumachre, Dominique Berdoz, Anna Pritzen

Affiliations

2017–current	Association for Psychological Science (APS)
2015-current	International Positive Psychology Association (IPPA)
2014-current	Swiss Positive Psychology Association (SWIPPA)

Languages Proficiency & Related Skills

Native	Chinese (Stylistically competent also in the creation of scientific texts)
Excellent	English & German (C1, Full professional proficiency in speaking and writing)
Advanced	Microsoft Office, E-prime, SPSS, R, Noldus Observer

Media

Southern Metropolis Daily (Oct 21, 2009); Foshan Daily (Oct 20, 2009)

Varia

2016-2017	Qualification Program – Teaching Skills (6 ECTS), Center for University Teaching and Learning, University of Zurich, Switzerland
2015	Member of local organizing committee, 13th European Conference on Psychological Assessment, Zurich, Switzerland
2015	Oxford Mindfulness Summer School 2015, Mindfulness in the 21st Century with Mark Williams and Chris Cullen, Oxford, England, 24-28 August, 2015
2013	Internship at Sigma Center, private clinic for psychiatry, psychotherapy and psychosomatic medicine, Bad Säckingen, Germany
2008-2009	President of the Editorial Department, Students' Career Development Association, Sun Yat-sen University, China

Publications

Papers under review & Ongoing Work

Pang,D., Eichstaedt, C. J., Buffone, A., Slaff, B., Ruch, W., & Ungar, H. L. (2018). The Language of Character Strengths: Predicting Positive Traits on Social Media. Manuscirpt under review. [Journal of Personality].

Pang, D. & Ruch, W. (2018). The mutual support model of mindfulness meditations and character strengths. Manuscrip under review. [Mindfulness].

Guntuku, S. C., You, R., **Pang, D.**, Cui, X., Shen, Z., & Ungar, H. L. (2019). Studying development and gender differences in china through weibo. Manuscript in preparation.

Pang, D. & Ruch, W. (2019). A new perspective on how mindfulness meditation affects emotion reactivity and regulation: a FACS study. Manuscript in preparation.

Peer-reviewed journal articles

Heintz, S., Ruch, W., Platt, T., **Pang, D.**, Carretero-Dios, H., Dionigi, A., ... & Chłopicki, W. (2018). Psychometric comparisons of benevolent and corrective humor across 22 countries: The virtue gap in humor goes international. *Frontiers in Psychology, 9*, 92. doi:10.3389/fpsyg.2018.00092 [Impact Factor: 2.321]

Hofmann, J., Heintz, S., **Pang, D.**, & Ruch, W. (in press). Differential relationships of light and darker forms of humor with mindfulness. *Applied Research in Quality of Life, Special Issue "Character strengths, well-being, and health in educational and vocational settings"*.

Pang, D. & Ruch, W. (in press). Fusing Character Strengths and Mindfulness Interventions: Benefits for Job Satisfaction and Performance. *Journal of Occupational Health Psychology*.

Pang, D. & Ruch, W. (2018). Scrutinizing the components of mindfulness: Insights from current, past and non-meditators. *Mindfulness.* Advance online publication. doi:10.1007/s12671-018-0990-4 [Impact Factor: 3.692]

Pang, D. & Proyer, R. T. (2018). An initial cross-cultural comparison of adult playfulness in mainland China and German-speaking countries. *Frontiers in Psychology, 9, 421.* doi: 10.3389/fpsyg.2018.00421 [Impact Factor: 2.321]

Book chapters

Pang, D., Li, G., Qian, H., Luo, L., Qiu, P., Yang, W., & Lei, H. (2009). 对在免费义务教育政策颁布后进城务工就业农民随迁子女的教育现状探究及思索 [Investigations and reflections on the current educational condition of the children of migrant peasant-workers in the city after the free compulsory education policy was promulgated]. In S. Huang (Ed.), *Hongyi archives* (pp. 525-548). Guangzhou, China: Sun Yat-sen University.

(Featured by two local newspapers: Southern Metropolis Daily in Oct 21, 2009, and Foshan Daily in Oct 20, 2009)

Congress contributions

Workshops

Pang, D. (2018, October). Mindfulness and Positive Psychology: Information on Healthy Research at UZH. Invited workshop at 100 Ways of Thinking Exhibision, Zurich, Switzerland, October 05, 2018.

Pang, D. (2017, September). Mindfulness and spirituality in interreligious context. Invited workshop at the further education day of manastery Fahr, Zurich, Switzerland, September 19, 2017.

Pang, D. & Heintz, S. (2016, July). *The Facial Action Coding System (FACS): Some Basics and its Applications.* Workshop presented at the 16th International Summer School and Symposium on Humor and Laughter: Theory, Research and Application, Brasov, Romania, July 4- 9, 2016.

Symposia

Pang, D. (2017, November). Integration von Charakterstärken in die achtsamkeitsbasierte Intervention: Die Rolle der Stärkenanwendung am Arbeitsplatz. Symposium presented at the congress of Swiss Positive Psychology Association (SWIPPA), Zurich, Switzerland, November 24, 2017.

Pang, D. & Ruch, W. (2017, July). Integrating Mindfulness and Character Strengths in the Workplace: Mindfulness-based Strengths Practice (MBSP) to Promote Well-being and Performance at Work. Symposium presentation at the Fifth World Congress on Positive Psychology, Montreal, Canada, July 13-16, 2017.

Paper Presentations

Pang, D. & Ruch, W. (2016, November). Integrating mindfulness and character strengths in workplace: Mindfulness-based strengths practice (MBSP) to promote well-being and performance at work. Paper presented at the congress of Swiss Positive Psychology Association (SWIPPA), Zurich, Switzerland, November 25, 2016.

Pang, D. & Ruch, W. (2016, July). *The virtue perspective of humor: Validating the BENCOR-Inventory in Mainland China and a first cross-cultural comparison*. Paper presented at the 16th International Summer School and Symposium on Humor and Laughter: Theory, Research and Application, Brasov, Romania, July 4- 9, 2016.

Pang, D. & Ruch, W. (2016, June). *The mutual support model of mindfulness practice and character strengths*. Paper presented at the 8th European Conference on Positive Psychology (ECPP2016), Angers, France, June 28 - July 1, 2016.

Panel

Pang, D. (2016, November). The present of staying present: benefits of mindfulness for well-being and productivity. Public panel discussion on “Mind Full or mindful?”, Zurich, Switzerland, November 3, 2016.

Posters

Pang, D & Ruch. W. The effect of mindfulness-based strengths practice on job satisfaction and task performance: The mediating role of strengths application. Poster presented

at the 30th American Psychological Science (APS) Annual Convention, San Francisco, CA, USA, May 24-27, 2018.

Pang, D. & Ruch, W. (2015, November). Is mindfulness good for strengths? Poster presented at the congress of Swiss Positive Psychology Association (SWIPPA), Zurich, Switzerland, November 27, 2015.

Pang, D. & Ruch, W. (2015, July). *A hierarchical factor analysis of the Five Facet Mindfulness Questionnaire*. Poster presented at the 13th European Conference on Psychological Assessment (ECPA13), Zurich, Switzerland, July 22-25, 2015.

Pang, D. & Ruch, W. (2015, July). *Psychometric properties of the German validation of the Toronto Mindfulness Scale*. Poster presented at the 13th European Conference on Psychological Assessment (ECPA13), Zurich, Switzerland, July 22-25, 2015.

Pang, D. & Proyer, R. T. (2014, May). *A cross-cultural comparison of adult playfulness in Mainland China and Switzerland*. Poster presented at the Licentiate-, Master-, and Doctorate-Congress (LiMaDoKo), University of Zurich, Switzerland, May 22, 2014.

Pang, D. & Proyer, R. T. (2013, September). *A cross-cultural comparison of adult playfulness in Mainland China and Switzerland*. Poster presented at the 13th Congress of the Swiss Psychological Society (SGP), Basel, Switzerland, September 11-12, 2013.

Pang, D. & Proyer, R. T. (2013, May). *A cross-cultural comparison of adult playfulness in Mainland China and Switzerland*. Poster presented at the Licentiate-, Master-, and Doctorate-Congress (LiMaDoKo), University of Zurich, Switzerland, May 30, 2013.

Yue, Z., **Pang, D.**, & Wen, L. (2012, October). *Perceiving more distant in space: the presence of an out-group person reduces the range of near space*. Poster presented at the Annual Meeting of General Psychology and Experimental Psychology of the Chinese Psychological Society (CPS), Wuhan, China, October 18-20, 2012.